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THE GENUS ROMULEA IN SOUTH AFRICA

MIRIAM P. DE VOS

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NEWS-LETTER OF THE SOUTH AFRICAN ASSOCIATION OF BOTANISTS
NUUSBRIEF VAN DIE SUID-AFRIKAANSE GENOOTSKAP VAN PLANTKUNDIGES

DIE DEPARTEMENT VAN PLANTKUNDE, UNIVERSITEIT VAN STELLENBOSCH:

Die doserende personeel van die departement kon die akademiese jaar weer op volle sterkte onder die voorsitterskap van prof. P.G. Jordaan begin. Ons kan met dankbaarheid vermeld dat hy volkome van sy ernstige hartaanval herstel het.

Die departement voel baie verheug dat die resultate van prof. M.P. de Vos se werk oor *Romulea* gepubliseer is. Dit is die resultaat van 20 jaar se konsensieuse navorsingswerk wat as supplement 9 tot die "Journal of South African Botany" verskyn het. Sy het omtrent twintig nuwe spesies en subspesies ontdek en beskryf. In die werk het sy haarself openbaar as 'n kunstenaar aangesien haar werk baie goed geïllustreer is en selfs van die kleurillustrasies is haar eie werk. Met die drukkoste, wat geweldig hoog was (± R7 000), was sy gelukkig om ruim ondersteuning te kry van die Jubileumfonds van Kirstenbosch, die Nasionale Botaniese Tuine en die WNNR, maar moes nog 'n groot bedrag uit haar eie sak betaal.

Die vernaamste resultate van dr. J.J.A. van der Walt se navorsing oor die Suid-Afrikaanse *Commiphora*-spesies, sal in die volgende uitgawe van Bothalia gepubliseer word. Hy onderneem tans 'n taksonomies-morfologiese studie van die *Commiphora*-spesies wat in Suidwes-Afrika voorkom.

Prof. M.P. de Vos is besig met 'n hersiening van die genus *Syringodea* (dit is naverwant aan die genus *Romulea*.) Sy onderneem ook om chromosoomstudies van die 8 spesies te doen.

2/...

Mnr. J.E. Watts, lektor in die departement, het sy navorsingsprojek oor die invloed van boor op die metabolisme van fenoliese verbindings in die grondboontjieplant voltooi, en het 'n M.Sc.-graad (*cum laude*) ontvang op die gradeplegtigheid van die Universiteit van Stellenbosch aan die einde van 1972.

Navorsingsprojekte van Ph.D.-studente

Mnr. J.H. Jooste se ondersoek van die meganisme van mineraalsoutopname deur die wortels van blare van plante met besondere verwysing na spoorelemente is bykans voltooi.

Mnr. J. Aalbers ondersoek die invloed van boor op proteïen- en nukleïensuur metabolisme in plante.

Mnr. L.J. van Lelyveld is besig met 'n fisiologiese ondersoek van die swarthartverskynsel by pynappels.

Navorsingsprojekte van M.Sc.-studente

Mnr. L.M. Raitt is besig met 'n projek getiteld: "Sodium tolerance in *Didelta* L'Hérit."

Mnr. P.S. Bester ondersoek die invloed van aluminiumtoksisiteit op plante.

Mej. J. van Reenen het begin met 'n studie van die anatomie en sitologie van die genus *Gethyllis*.

Mnr. A.D. Spreeth sit die taksonomies-morfologiese studie van *Agathosma* spp. voort.

Mnr. P.J. Laubscher gaan voort met 'n embriologiese studie van *Lachnanthes tinctoria*.

Mnr. M.C. Rutherford het sy navorsingsprojek getiteld: "A study of ecosystem function in Burkea-Terminalia savanna of the Northern Kalahari" wat hy onder leiding van dr. J.G. Smith onderneem het, afgehandel. Hy is besig om die resultate te verwerk vir sy M.Sc.-verhandeling. Daar het sopas 'n publikasie van hom in Dinteria no. 8, Nov., 1972, verskyn. Dit is getitled:

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JOURNAL
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VOLUME NO. 9

THE GENUS ROMULEA IN SOUTH AFRICA

BY

MIRIAM P. DE VOS

Department of Botany, University of Stellenbosch, Stellenbosch.

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THE GENUS ROMULEA IN SOUTH AFRICA

Abstract

This revision of the South African species of the genus *Romulea* (Iridaceae) is based on a study of herbarium specimens and living plants in their natural habitats. The gross morphology of all parts of the plant, including the corm of which several types occur, as well as the leaf anatomy and chromosome numbers which show an aneuploid series, has been studied. Hybridisation experiments were carried out to find some additional evidence on the relationships and evolution of some of the taxa.

The genus is redefined to include a new subgenus, *Lomurea*, comprising three species. This differs from the subgenus *Romulea* mainly in its salver-shaped flowers with long perigone tubes, and is morphologically intermediate between *Romulea* and *Syringodea*.

Detailed descriptions of 68 species and 26 subspecific taxa grouped in nine sections, are dealt with. Twenty-five are new species, eleven of these being local endemics with apparently restricted areas. Five large aggregate species, with subspecific taxa, are recognised. The synonymy for each taxon is given, as well as the geographical range, and numerous specimens are cited. Several nomenclatural changes are proposed, and keys to the sections, species and varieties are provided. Most species descriptions are illustrated with line drawings, and several with figures or photographs in colour.

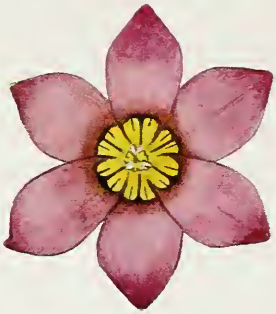
Uittreksel

Die Genus *Romulea* in Suid-Afrika

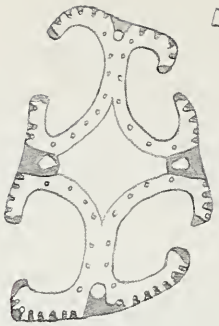
Hierdie hersiening van die Suid-Afrikaanse species van die genus *Romulea* (Iridaceae) is gebasseer op 'n studie van herbariummateriaal en lewende plante in hul natuurlike habitatte. Die uitwendige morfologie van al die plantdele, insluitende die gerokte knol waarvan daar verskeie tipes is, asook die blaaranatomie en die chromosoomgetalle, wat 'n aneuploiede serie toon, is bestudeer. Kruisingseksperimente is uitgevoer om bykomende gegewens te verkry oor die verwantskappe en evolusie van sommige taxa.

Die genus is herdefinieer om 'n nuwe subgenus, *Lomurea*, in te sluit, met drie species, wat van die subgenus *Romulea* hoofsaaklik verskil in hul trompetvormige blomme met lang blomdekbuise, en wat morfologies tussen *Romulea* en *Syringodea* staan.

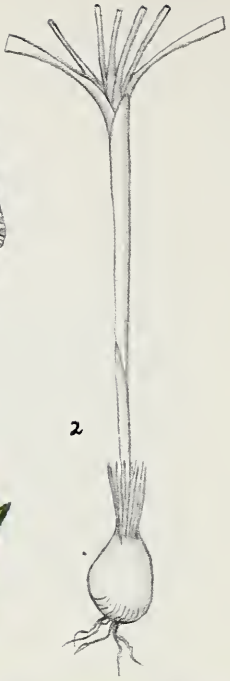
Altesame 68 species en 26 subspesiese taxa is beskryf, ingedeel in nege seksies. Vyf-entwintig is nuwe species, en elf daarvan is plaaslike endemiese species met skynbaar klein verspreidingsareas. Vyf groot polimorfe species met verskeie subspesiese taxa word erken. Die sinonimiek vir elke taxon word gegee, asook die geografiese verspreiding; 'n groot aantal eksemplare word gesiteer. Verskeie nomenklatoriese veranderings is voorgestel, en sleutels word gegee vir die seksies, species en varieteite. Die meeste species is geïllustreer met lyntekeninge en sommige met tekeninge of foto's in kleur.



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INTRODUCTION

The genus *Romulea* Maratti (Iridaceae) is mainly confined to Africa and the countries around the Mediterranean Sea. In South Africa, especially in the South-Western Cape Province, it has become much more diversified than in the northern hemisphere, producing numerous species, several with specialised features which are unknown amongst the species of the northern hemisphere.

Previous taxonomic treatments of the genus, the South African species included, were made in Europe and England: Klatt (1895) recognised 32 South African species, but Baker in the Flora Capensis (1896) only 20; Béguinot, who monographed the genus in 1907–1909, included 36 South African species. The work of these investigators was limited mainly to the study of herbarium material; although several Cape romuleas were grown and depicted in Britain and Europe in the eighteenth and nineteenth centuries, it was often difficult to identify a figure with any dried specimen of a Cape romulea obtained from its natural environment.

The study of the genus from herbarium specimens alone, was not satisfactory, and this made Diels (1930) state, when he revised the Iridaceae for Engler and Prantl's "Die Natürliche Pflanzenfamilien", that the delimitation of the species was still very uncertain, and needed thorough study in the native country (of the species). Since Béguinot's monograph, about 16 new Cape species of *Romulea* were described in numerous journals, which made the existing keys useless.

For the present revision, fresh material of almost all the species has been collected over the whole range of the genus in South Africa; in this way more material was obtained of the 19 new species which still lay undescribed in South African herbaria; furthermore, an additional six new species were discovered which had never been found before. Many of these new species are local endemics with apparently very restricted areas.

From the fresh material, studied in the veld and after transplanting to the experimental garden, a first-hand knowledge of the structure, phenology and reproduction of many species has been obtained. The chromosomes of the majority of species have also been investigated, and hybridisation experiments carried out, in order to obtain more data on the relationships of the species, and a more natural classification.

FIG. 1.

R. subfistulosa (*J. & dV.* no. *1585*). 1, plant. 2, base of a plant with a deeply seated corm. 3, flower. 4, outer, and 5, inner perianth segments, lower surfaces. 6, bract. 7, bracteole. 8, pistil, stamens, and perianth tube ×2,25. 9, transverse section of leaf ×10. Fig. 1, & 3–7, ×7/8.

Acknowledgements

My thanks are due to the directors and curators of the following herbaria who allowed me to examine their material or sent specimens on loan, including type specimens (the abbreviations used for herbaria in this revision are those standardised in the Index Herbariorum 1964):

BOL Bolus Herbarium, University of Cape Town
BLFU Herbarium of the University of the O.F.S.
GRA Albany Museum Herbarium, Grahamstown
NBG Compton Herbarium, National Botanic Gardens, Kirstenbosch
PRE National Herbarium, Pretoria
RUH Rhodes University Herbarium
SAM South African Museum Herbarium, Kirstenbosch
STE Stellenbosch University and Government Herbaria
B Botanisches Museum, Berlin-Dahlem
BM British Museum Herbarium
C Botanical Museum and Herbarium, Copenhagen
CGE Herbarium of the Botany School, University of Cambridge
E Herbarium of the Royal Botanic Garden, Edinburgh
G Conservatoire et Jardin Botanique, Genève
GH Gray Herbarium, Harvard University
K Kew Gardens Herbarium
L Rijksmuseum, Leiden
LD Botanical Museum, Lund
LINW The Linnean Society, London
M Botanische Staatssammlung, München
MEL National Herbarium of Victoria, Melbourne, Australia
OXF Oxford University Herbarium
P Museum National d'Histoire Naturelle, and the Lamarck Herbarium, Paris
S Naturhistoriska Riksmuseet, Stockholm
SRGH Federal Herbarium, Salisbury
UPS University of Upsala Herbarium and Thunberg's Herbarium
US National Museum Herbarium, Washington DC
WV Botanisches Institut der Universität Wien
Z Herbarium of the University of Zürich

I am also indebted to the directors of the Bolus Herbarium, National Herbarium, Pretoria, Compton Herbarium, and the British Museum Herbarium for the opportunity to make use of their libraries.

I wish to express my sincere thanks to the many persons who have helped me in various ways: in particular to Dr. Elsabe Malan and Miss A. Uys who were my companions on many collecting trips and helped to collect material;

to several others who contributed specimens, especially Mrs. H. M. Burger, Dr. B. L. Burtt and Miss O. Hilliard, Dr. A. Jacot-Guillarmod, Miss W. F. Barker, Miss E. Esterhuysen, Mr. J. W. Loubser, and Dr. P. Goldblatt; and to the technical staff of the department of Botany of the University of Stellenbosch, especially to Mrs. J. M. Serdyn and Mr. G. C. Crafford, the curator and assistant curator of the University Botanic Garden, and the staff of the STE herbarium, all of whom helped in many ways; to several botanists who have freely given information and advice, in particular to Prof. P. G. Jordaan, Dr. B. Nordenstam, John Lewis, Prof. E. A. C. L. E. Schelpe, Dr. A. V. Hall, Dr. H. Heine for information on specimens in the Lamarck Herbarium, Paris, Jan Tengnér for information on specimens in the Bergianus Herbarium, and W. T. Stearn for photocopies of Herbert's unpublished figures.

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Figure 91 is reproduced with the kind permission of the editor of "The Flowering Plants of Africa".

GENERAL MORPHOLOGY AND ANATOMY

Habit

The genus Romulea consists of perennial geophytes which survive the dry season (summer in the south-western Cape Province) in the form of underground tunicated corms.

At the beginning of a growing season (April in the south-western Cape) a cluster of adventitious roots is formed near the base of the corm, and the topmost axillary bud on the corm develops into a flowering shoot. The corm gradually gives up its food material and shrinks. The basal internodes of the shoot start storing food material and swell up, forming a new corm which replaces the old shrunken one. The new corm remains dormant until the next growing season.

The plants range from 3,5 to 50 centimetres in height. The stem remains short in some sections, e.g. the *Roseae*, *Hirtae*, *Bicarinatae*, and may elongate in others, e.g. in the sections *Romulea* and *Aggregatae*, especially when the plants grow among tall vegetation.

Flowers are few and open one after another. They are thermonastic, opening and closing for three to five or six consecutive days. They are slightly protandrous and almost all the species tested are self-compatible. The capsules, containing numerous seeds, generally dehisce soon after drying out at the end of the growing season (October to November in the south-western Cape), except for the subsection *Cruciatae*, in which the capsules may remain closed throughout the summer. Seeds which were tested, did not germinate before autumn; then they took about three weeks to germinate.

Corm

The tunicated corm consists of a small number of swollen, basal internodes of the axis and is covered with a few persistent leaf bases which form hard, smooth tunics. The older corms of *R. fibrosa* also become covered with a mass of fibres which are the remains of the vascular bundles of old leaf bases.

Adventitious roots develop in a row or a cluster from a basal ridge or basal point of the corm. This represents the ventral side of the rhizome from which the corm of the Iridaceae evolved (Lewis 1954). A contractile root is formed only when the corm is too high in the ground, e.g. in seedlings. It is larger than the ordinary adventitious roots and develops at the basal scar.

In most species the new corm is obliquely attached to the old one at a point, the basal scar (de Vos 1970b), which is generally situated towards one side and is not quite basal. In subsection *Hirsutae* and in *R. amoena*, however, which have symmetrical, campanulate corms, the basal scar is in the centre of a basal disc, and the new corm develops on top of the old one.

Corm tunics.—Two to four nodes, crowded together, with abbreviated internodes between them, are present around the basal scar. At these nodes a similar number of basal sheaths (leaves without laminas, see under Leaves) are attached and sometimes also the lowermost foliage leaf. The base of one of these leaves becomes lignified, thicker, and more rigid than the other leaf bases, and forms the principal hard, smooth corm tunic. The other leaf bases from the basal scar form thin, membranous inner tunics.

Leaf bases from nodes higher up the corm also become lignified and form short, hard, cap-like tunics over the apex of the corm and around the base of the aerial shoot. All these leaf bases are closed, but in later years they split longitudinally to accommodate a larger corm.

The principal corm tunic is, with few exceptions, further strengthened by a subepidermal layer of calcium oxalate crystals formed underneath the abaxial epidermis. The latter flakes off later, but the crystals are firmly clamped down by the anticlinal walls of the layer of sclereids below them (de Vos 1970b).

At the top and the base of the corm, lignification of the tunics and the formation of crystals take place in distinct patterns, alternating with strips of unlignified parenchyma in which crystals are absent. The lignified strips form fibres or teeth, between which slits appear when the unlignified parenchyma decomposes later. At the top of the corm, around the base of the aerial shoot, the teeth or fibres are acuminate and are usually from 5 to 20 mm in length, or occasionally longer. At the base of the corm minute fibrils, in small groups or in parallel arrangement, or strong, acuminate, straight or bent teeth occur. The roots, when they appear, force their way through the weak, unlignified slits between these teeth or fibrils.

Corm types.—In the South African species the corms differ in shape and in the tunic teeth or fibres, and also, therefore, in the slits formed in the tunics at the bases of the corms. For example, in a number of sections a sharp transverse fold or ridge is formed by intercalary growth in the young tunic, where it stretches over the base of the corm. In this way a crescent-shaped or circular basal ridge is produced. In several other sections the tunics are stretched over a rounded or pointed base, without forming a transverse fold. Several corm types have been recognised (de Vos 1970b):

1) Symmetrical, campanulate corms with the basal scar in the centre of a circular basal disc, around which a circular basal ridge occurs. To this belongs subsection *Hirsutae*, with parallel fibrils on the basal ridge (*hirsuta* type, Fig. 2a), and *R. amoena*, with minute groups of fibrils (*amoena* type, Fig. 2b).

2) All the other corms are asymmetrical with the basal scar in a lateral position, and with either a crescent-shaped basal ridge, or a rounded or pointed base.

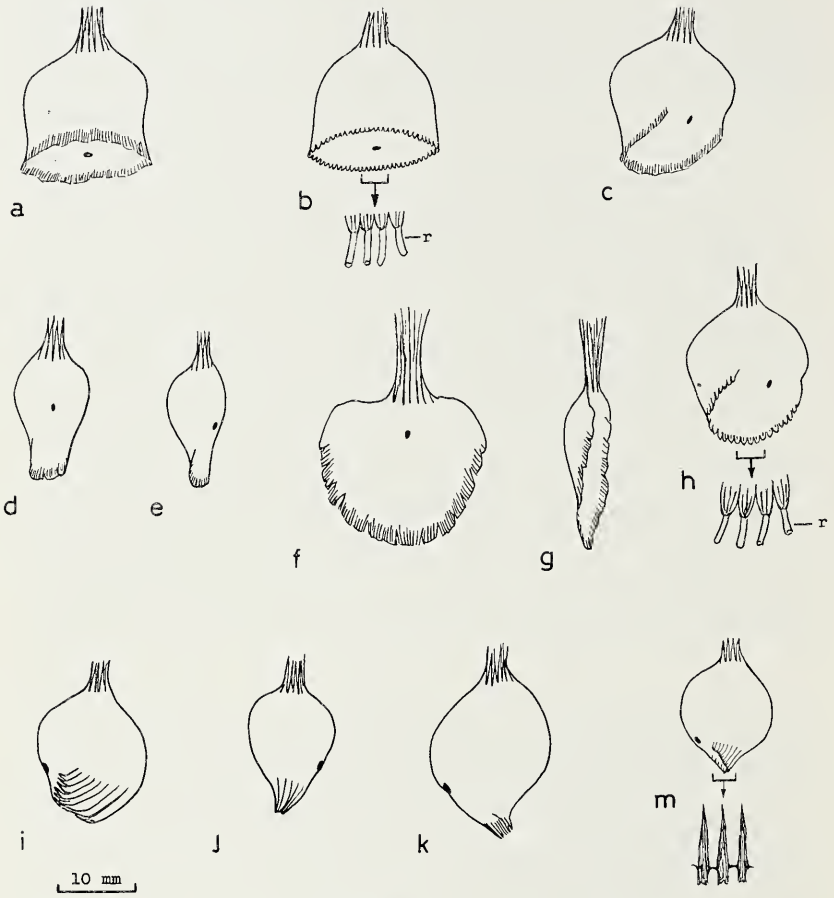


FIG. 2.
Corm types of South African romuleas. a, hirsuta type (subsect. Hirsutae); b, amoena type (R. amoena of subsect. Amoenae), with some fibril clusters enlarged; c, ciliata type (subsect. Ciliatae, Aquaticae); d, e, spatulata type seen from two sides (subsect. Minutiflorae); f, g, tortuosa type seen from two sides (subsect. Tortuosae); h, aggregata type (subsect. Aggregatae) with some fibril clusters enlarged; i, rosea type (sect. Bicarinatae, subsect. Roseae, Atrandrae, Campestres); j, cruciata type (subsect. Cruciatae); k, autumnalis type (subsect. Autumnales); m, pratensis type (sect. Pratenses); r, adventitious roots.

Corms with a crescent-shaped basal ridge can further be divided into several types, according to the shape of the basal ridge and the fibrils on the ridge. The *ciliata* type has minute parallel fibrils on a sharp-angled basal ridge which is about as wide as the corm itself (Fig. 2c, subsections *Ciliatae*, *Aquaticae*, and all species of the northern hemisphere). The *spatulata* type (Fig. 2d, e, subsection *Minutiflorae*) has a high, somewhat flattened or wavy basal ridge; the *tortuosa* type a wide, fan-shaped ridge (Fig. 2f, g, subsection *Tortuosae*). The *aggregata* type has a row of small clusters of fibrils on the ridge (Fig. 2h, subsection *Aggregatae*), with a root forcing its way through a weak spot in the centre of most of the fibril clusters.

Corms with rounded or pointed bases are divided into the *rosea* type with long, curved, acuminate teeth bent over the rounded base (Fig. 2i, sections *Bicarinatae*, some *Hirtae*, and most of the *Roseae*), and the *cruciata* type with strong, almost straight, acuminate teeth converging towards a basal point (Fig. 2j, subsection *Cruciatae*).

Intermediate between the cruciata and ciliata types is the *autumnalis* type (Fig. 2k, subsection *Autumnales*), with a very small basal ridge which gives the corm an almost pointed base. Another intermediate type is the *pratensis* type (Fig. 2m, section Pratenses), with teeth which bend rather sharply over the basal ridge and later break up on the ridge.

The characters of the corm tunics are constant in the South African species of Romulea and contribute some of the most useful features for classifying these species. The different corm types are readily recognisable in most herbarium material, as only a small proportion of specimens are without corms. These features are being used in the present investigation, especially as some correlation has been found between corm characters, leaf anatomy, and chromosome numbers (see Table 2).

Vegetative reproduction.—When two, or rarely three, axillary buds on a corm develop into leafy shoots in one season, each forms its own new corm at its base. The sister corms remain together, still partially enclosed within the old corm tunics. In no case have underground runners been found, by which new corms can be formed at some distance from the old ones.

Aerial Axis

The aerial axis produced every year, forms a small number of internodes with a cauline leaf at each node. It is very short (from a few millimetres up to 20 mm) and completely hidden by the sheathing leaf bases, or is elongated, sometimes up to 30 cm, and extends above-ground. This is the more primitive stem type.

In species with corms of the amoena, tortuosa, spatulata, rosea, cruciata,

and autumnalis types, the stem is short at anthesis, but may later elongate slightly. In these species all the foliage leaves at first appear to be basal.

In species with other corm types the stem often elongates before anthesis. This elongation is controlled genetically, but is also to some extent determined by the amount of available light. This characteristic is nevertheless of value in classifying species, especially when large numbers of specimens are available for examination. Stem elongation is brought about mainly by an elongation of the first internode above the corm. Second, and higher internodes if present, do not elongate much, and the cauline foliage leaves are therefore borne near the top of the leafy stem.

The main axis ends in a peduncle with a single terminal flower. From the axil of each cauline leaf an axillary bud may develop into another one-flowered peduncle or into a short lateral shoot bearing one or two peduncles (see Inflorescence). In *R. dichotoma* the basal internode of the axillary shoot(s) is as long and as strong as the internode on the main axis opposite it; the main stem is pushed somewhat to one side, so that an apparently dichotomous branching is brought about.

Leaves

The leaves have been studied by Béguinot (1907b–09) and de Vos (1970c). A summary is given here.

The leaves, which appear in spirodistichous or distichous sequence, are of three types:

Cataphylls

The first leaves to appear every growing season are one, two, or rarely up to four, bifacial, erect, somewhat membranous cataphylls, several centimetres long, sheathing the corm and base of the aerial shoot, and therefore called *basal sheaths*. In its lower half the margins of a cataphyll are united to form a closed sheath over the corm. The upper part becomes green if it is extended above-ground. A unifacial, terete blade, like that in the foliage leaf, is not formed. These basal sheaths are of no value in distinguishing species.

Hypsophylls

Each flower is subtended by a two-valved spathe which protects the bud and later the ripening capsule. The characters of the spathe valves (bract and bracteole) are useful in classifying species. See under Inflorescence.

Foliage leaves

One, two, or rarely, three basal foliage leaves develop from nodes on the upper half of the corm, and sometimes also from the uppermost node of the basal scar of the corm. Some time later a small number of cauline leaves develop from nodes on the aerial stem.

The number of basal leaves is generally constant in a species; e.g. a single basal leaf occurs in *R. aquatica*, *R. flava*, and *R. jugicola*, and two in *R. multisulcata*, most *Aggregatae*, *Hirsutae*, and *Ciliatae*. Exceptions are few, e.g. *R. tabularis* has one or two basal leaves, *R. namaquensis* two or three, and *R. dichotoma*, which generally has a single basal foliage leaf, sometimes has young plants with two.

Only in species with elongated stems can the basal and cauline leaves clearly be distinguished from each other. In short-stemmed species all foliage leaves appear to be basal, with the inner (upper) leaves shorter than the outer ones.

The number of cauline leaves ranges from one to five. They are usually shorter than the basal leaves. In long-stemmed plants the upper cauline leaves are bract-like, with the terete lamina reduced in length, or even absent.

The leaf base is sheath-like, stem-clasping and bifacial. Usually it merges gradually into a unifacial lamina which is 0,3—5 mm in diameter and filiform and terete or compressed-cylindrical, or more rarely 4-winged or 8-winged. The unifacial part usually starts more or less halfway up the basal leaf, except in the Tortuosae where generally only the top 15—60 mm is unifacial.

Typically the unifacial lamina has four longitudinal grooves or furrows containing all the stomata and, alternating with the grooves, four ribs, two in the median plane and two transverse. The lower median rib represents the midrib of the leaf and the upper one the leaf margins. In the leaf sheath grooves and ribs are absent.

A number of species show a derived leaf structure (see also de Vos 1970c):

1) In the *Tortuosae* the leaf is largely bifacial and conduplicate, usually only the topmost 10—60 mm being unifacial.

2) In *R. subfistulosa* the margins of the ribs are widened into eight longitudinal flanges or wings (Fig. 1) which are especially prominent when the plants grow under humid conditions. The leaf is up to 5 mm wide and has an almost open canal in the centre.

3) In subsection *Aquaticae* five to eight grooves are present (Fig. 40, 41), and the number of stomata is thereby increased. This is probably an adaptation to an aquatic habitat.

4) In *R. cruciata* and *R. hirsuta* var. *zeyheri*, both of which have wide grooves, a narrow, extra, longitudinal rib is sometimes formed in the middle of each groove (Fig. 88). This was figured by Jacquin (1786–93) for *Ixia cruciata*, but it is by no means a constant feature for this species.

5) In *R. dichotoma* the lateral ribs are somewhat reduced, and are partially enclosed by the two well-developed median ribs (Fig. 57). In *R. hirta* and *R. tetragona* the lateral ribs have disappeared almost completely, and on each

side the two grooves are confluent and form a wide, shallow, longitudinal channel. The margins of the median and ventral ribs are extended, and form four longitudinal wings, giving the leaf an X-shaped appearance in transverse section (Fig. 91). These two species are not closely allied to *R. dichotoma* and reduction of the lateral ribs probably took place more than once in the genus.

6) In *R. barkerae* the leaf is almost T-shaped in transverse section, two wide grooves and one wide rib and a narrow rib being present (Fig. 25). The wide rib represents the two lateral ribs joined to the median rib, the two grooves normally separating these ribs being absent. The grooves present are those nearest the ventral rib. This leaf resembles that of *Crocus* in its two grooves occurring between the lateral and ventral bundles, but differs in its blade being unifacial (cf. Arber 1921). It differs from the 2-grooved leaves of the section *Hirtae* where the lateral ribs have disappeared.

Vascular bundles.—Invariably a large vascular bundle runs up the middle of each rib. Each bundle is surrounded by a sclerenchymatic and a parenchymatic bundle sheath, one or both of which may be interrupted. In several sections e.g. the *Roseae* and *Bicarinatae*, the sclerenchymatic sheath is large and massive, reaching up to the epidermis and interrupting the parenchymatic sheath there. The latter sheath is therefore U-shaped in transverse section. The sclerenchymatic sheath is smaller in the *Hirsutae*, *Ciliatae* and *Tortuosae*, and is frequently interrupted laterally. The parenchymatic sheath is mostly cylindrical in these sections.

Many species with leaves one millimetre or more in diameter have one or two small, superficial vascular bundles on each side of the large ones. Several small vascular strands, mostly without sclerenchyma, occur deeply embedded in the mesophyll, with some anastomoses to the other bundles.

Crystals.—Two types of crystals occur in the leaves:

1) Styloids of calcium oxalate monohydrate, 80—180 μm in length, occur in idioblasts scattered in the mesophyll of all species examined. In most species with cylindrical parenchymatic bundle sheaths they also occur in these sheaths. In the *Roseae* and some species of the *Atrandrae*, styloids are found in the two sub-epidermal cell rows of the U-shaped parenchymatic sheaths where they come in contact with the epidermis on each side of the vascular bundle.

2) In a number of sections and subsections which have no styloids in their sheaths, e.g. the *Atrandrae*, *Autumnales*, *Hirtae*, and two species of subgenus *Lonurea*, short isodiametric or slightly elongated, 8-sided or 12-sided crystals of calcium oxalate occur in subepidermal idioblasts in the sclerenchymatic bundle sheaths of most of the larger vascular bundles. By means of paradermal sections the *Autumnales* and *Atrandrae* can readily be distinguished from subsection *Roseae*, where such crystals are absent.

Correlations in anatomical characters.—Certain histological characters of the leaf structure are generally correlated and are of importance in distinguishing sections of the genus. These characters are also correlated with certain corm types (de Vos 1970b).

1) In the *Hirsutae*, *Longitubae* and *Tortuosae*, most *Aggregatae* and *Ciliatae*, the foliage leaves have large (ca. 25—60 µm high), relatively thin-walled, probably water-storing epidermal cells on the leaf ribs. The vascular bundles are associated with small sclerenchymatic bundle sheaths which are generally separated from the epidermis by complete, cylindrical, parenchymatic bundle sheaths. The latter generally possess idioblasts with styloids. The rib margins are sharply angled and have no sclerified strengthening tissue (except in *R. citrina*, *R. pearsonii* and *R. oliveri* of the *Ciliatae* and *R. sinispinosensis* of the *Minutiflorae*). This group possesses corms with a circular or semi-circular basal ridge.

2) In sections *Roseae*, *Bicarinatae*, *Hirtae*, and in two species of subgenus *Lomurea*, the epidermis on the ribs is small-celled (6—20 µm high) and relatively thick-walled. The vascular bundles are surrounded by large, thick-walled, sclerenchymatic sheaths, which are in contact with the epidermis over a large area. Rarely a continuous layer of sclerenchyma is present over the whole leaf rib. The parenchymatic bundle sheaths are incomplete and U-shaped in transverse section. These are usually without styloids, except in subsection *Roseae* and in some species of subsection *Atrandrae*, where styloids occur in the two rows of subepidermal cells of this sheath where it touches the epidermis. In sections where these styloids are absent, idioblasts with short, 8-sided or 12-sided crystals of calcium oxalate occur in the subepidermal sclerenchymatic layer in the costal zones. Further, the rib margins are rounded and are generally strengthened by fibre bundles. In the *Atrandrae* a small vascular strand is associated with these marginal fibre bundles. All these sections possess corms pointed or rounded at their bases.

3) Some intermediates occur which cannot be allocated to either of the above-mentioned groups. *R. pratensis*, *R. gigantea*, *R. minutiflora* and the *Aquaticae* have an epidermis with cells intermediate in size; the rib margins are sclerified, the parenchymatic bundle sheaths are cylindrical or incomplete and U-shaped, and the corms possess basal ridges.

In a few species, e.g. *R. amoena*, *R. albomarginata*, and *R. cedarbergensis*, the rib margins are strengthened by a multiseriate, thick-walled, but unlignified, epidermis. These species are not closely allied.

Epidermal papillae.—In several sections and subsections, from all three of the above-mentioned groups, e.g. the *Aquaticae*, *Hirtae*, *Minutiflorae*, most *Roseae* and *Atrandrae*, several *Ciliatae*, and in *Lomurea*, short epidermal papillae are present in the grooves. They are solid thickenings of the outer cell

walls and generally occur in a single row on an epidermal cell (except in the *Hirtae* where a double row is often present), varying in number from two to ten per cell for the genus. Within a single species the variation is smaller. They seem to be a constant feature of certain species and are therefore of value in distinguishing them.

Trichomes.—The leaves of most species are glabrous. Exceptions are *R. jugicola*, *R. hirta*, and *R. tetragona* which generally show rows of rather long hairs on the rib margins. Variation in this feature occurs in *R. dichotoma*, *R. flava*, *R. longipes*, *R. hirsuta* and in the section *Tortuosae*, where glabrous plants and others with a short, often sparse, ciliation on the margins of the leaf ribs, have been found.

Inflorescence

The main axis and each lateral branch terminate in a peduncle with a single terminal flower, sessile or subsessile within a bivalved spathe. The peduncles are arranged in pairs in a monochasial arrangement, the order of flowering being basipetal: the first flower to open terminates the main axis, and the second of the pair is at the top of the topmost lateral branch. A second pair of peduncles is borne similarly, terminating a primary lateral and a secondary lateral branch in the axil of the next lower cauline leaf. Thus the second lateral repeats the relationship of the main axis and upper lateral (de Vos 1971).

Sometimes a third and, rarely, a fourth pair of peduncles are formed in the next lower leaf axils. The second peduncle of a lower pair often does not develop.

This flowering arrangement is constant throughout the South African representatives of the genus, and possibly also throughout the whole genus. The only variations to be found are in the number of flowers formed, the length of the lateral branches which bear the peduncles, and in the tortion of the aerial shoot (spirodistichous in more advanced species instead of distichous). The number of flowers is influenced in some species by the environment and also by the age of the plant, younger plants often producing fewer flowers.

Peduncles.—The peduncles are naked except for the two spathe valves below the flower and a small membranous prophyll at the base of the second peduncle (de Vos 1971).

The peduncle is of some diagnostic value. In some species it is subterete and in others semiterete, the two flat surfaces of a pair of peduncles facing each other. Most peduncles are glabrous, except in a few species which have a sparse ciliation on the two sharp angles of their semiterete peduncles, and in *R. tetragona* which has hairy peduncles.

In many species the peduncles become recurved shortly after flowering,

with their flat surfaces on the convex side of the curve. This brings the ripening capsule nearer the ground or into the soil. When the mature capsule and peduncle dry out, the latter straightens in most species, except in the *Atrandrae* and *Tortuosae*, where it bends right over to the opposite side and curls up like a watch spring, its flat side becoming concave. When moistened, the peduncle bends back as in the unripe condition. These movements are hygroscopic and take place repeatedly.

The hygroscopic movements are brought about by an unequal shortening of the fibres, on drying, in the flat and rounded sides of the peduncle. This is probably caused by an unequal distribution of lignin in the fibres along the two sides: those near the flat surface are less lignified, and are able to shrink and extend more than the more highly lignified fibres in the opposite side (de Vos 1971).

In some species no hygroscopic movements occur. In a few, e.g. *R. cruciata*, *R. setifolia*, and *R. aquatica*, the peduncles remain more or less straight after flowering; in some other species, e.g. *R. dichotoma*, *R. sladenii*, and *R. multisulcata*, they bend at their bases after anthesis and become widely patent from their bases, remaining in that position on maturation.

Spathe valves.—The lower spathe valve is a bract and the upper a prophyll (bracteole), or pair of fused prophylls (Lewis 1954). Both show features which are of systematic value.

In most species the bract is green or greenish, with very narrow, and sometimes hardly visible, membranous margins. In some, e.g. many *Atrandrae*, the veins are strong and closely spaced, and in others, e.g. *Hirsutae* and many *Ciliatae*, more slender and widely spaced. In the *Bicarinatae* a stronger midrib is present in the bract, and the bracteole is strongly two-keeled and has two strong veins.

The bracteole, which is mostly subequal to the bract, is generally green or greenish in the centre, and has wide, colourless or brown-streaked or brown-speckled, membranous margins, generally narrowing to a green tip. The minute brown streaks or speckles often present on the membranous margins are caused by groups of sclereids with brown cell contents. In several species from the Karoo the sclereids tend to decrease in number when the plants are grown in moister surroundings.

Rarely the bracteole is wholly scarious (*R. flava* and *R. barkerae*), and in some, e.g. subsections *Tortuosae* and *Longitubae*, and in *R. malaniae* and *R. membranacea*, both bract and bracteole are largely submembranous, or membranous in at least the lower half. In *R. atrandra*, *R. luteoflora* and *R. pearsonii* the bract and bracteole have very characteristic, wide, brown-streaked, scarious tips and margins.

FLOWER

The flowers are actinomorphic and generally funnel-shaped (except in the subgenus *Lomurea*) with the perigone segments ascending and generally reflexed in the open flower. In *Lomurea* the flower is salver-shaped, resembling that of the genus *Syringodea*.

All the species are thermonastic, the flowers generally opening late in the forenoon and closing in the late afternoon, depending on the temperature. Temperature requirements of the species differ: in most the flowers open before noon, but the rare *R. vinacea* opens near 3 p.m. and closes after sundown.

The flowers generally open for three to five consecutive days when the weather permits. During this time they enlarge by several millimetres, e.g. a flower of *R. sabulosa* increased in size from 40 mm to 55 mm, during five days of opening. This is an enlargement of more than 30 per cent. The floral movements are caused by cell enlargement which takes place by turn in the adaxial and abaxial sides of the perianth segments during the diurnal rise and fall in temperature.

The flowers are scentless, with the exception of *R. aquatica* and *R. tortuosa* var. *aurea*, which are strongly scented, and a form of *R. flava*, named *R. fragrans* by Ecklon, which is faintly fragrant.

Perigone tube.—Most romuleas possess short, funnel-shaped perigone tubes, which are much shorter than the perigone segments, and generally not more than 12 mm in length. The subsection *Longitubae* and subgenus *Lomurea* are characterised by long, for the most part tubular perigone tubes, which are dilated towards the top. The shape of the flower in the *Longitubae* resembles that of *Crocus*. In the other Cape sections only one species, *R. kamisensis* of section *Romulea*, has been found to possess a long perigone tube.

In some large-flowered species the perigone tube is very short and cup-shaped (*R. atrandra*, *R. luteoflora*), or shallow and almost saucer-shaped (three species of the section *Bicarinatae*).

Small-flowered species and varieties have a perigone tube proportionally longer than that of large-flowered species. The smaller flower is caused by a decrease in the size of the segments and not of the tube.

Perigone segments.—The outer and inner perigone segments of a flower are generally almost similar, and equal or subequal in size. Only rarely (*Aquaticae* and *R. diversiformis*) do the two whorls differ appreciably in size and shape. In a number of species, e.g. *R. sabulosa*, *R. monadelpha*, *R. eximia*, slight differences in length or in width occur between the segments of the two whorls.

The shape of the segments generally ranges from more or less narrowly obovate or obovate-cuneate to narrowly elliptical. (Throughout this investigation, definitions given to these terms by the Committee for descriptive Biological Terminology of the Systematics Association [Taxon 11, 1962] have been used.)

Other shapes, e.g. subrhomboid-cuneate (*R. sabulosa*, *R. monadelpha*), and orbicular-spatulate (inner segments of *R. aquatica*) are rare.

Frequently the ratios between segment length and width, and also between the lengths of perigone tube and segments, are not constant within a species. In many species variation also occurs in the shape of the segment tips.

The colours of the flowers range from white or cream to yellow, orange, apricot, pink, lilac or magenta; a few species have blue or bright red flowers. In numerous species the colour is almost constant, e.g. in *R. sabulosa*, *R. monadelpha*, and *R. monticola*, but in many others, e.g. *R. rosea*, *R. hirsuta*, *R. flava*, and *R. atrandra*, there is considerable variation. Variation may also occur in the presence or absence, as well as in the size and shape, of dark blotches in the throat of the perianth, e.g. in *R. atrandra*, *R. monticola*, and *R. tortuosa*. In a number of species, e.g. *R. luteoflora* and *R. cruciata*, the markings on the backs of the outer perianth segments vary considerably.

In a few species colour variants form distinct geographical races; for instance, *R. rosea* var. *australis* generally has lilac-pink flowers in the western Cape Province and white flowers in the Knysna-Humansdorp area. Often, however, colour variants of a species occur together in a single population, e.g. in *R. rosea* and *R. flava*.

It is often impossible to identify a species from its flowers only, as certain species not closely related have almost similar flowers. Compare for instance *R. pratensis* with *R. gracillima* (Figs. 33 & 62) and *R. biflora* with *R. hirsuta* (Figs. 7 & 30).

The colours of the flowers are recorded in general terms in the descriptions of the species. In most species the flower colours have been compared with the colour chart of the Royal Horticultural Society (1966) and are also given as RHS numbers.

Stamens.—Certain characters of the stamens are constant throughout the genus. For example, the filaments are inserted in the perigone tube where it widens, i.e. in most species near the base of the tube, but in subsection *Longitubae* and subgenus *Lomurea*, which have long perigone tubes, in the upper half. The filaments are channelled along their inner side, and the anthers are linear and shortly sagittate at their bases. Pollen grains are monosulcate and punctitegillate (Van Tonder 1968 ined., Schulze 1971), almost globose or shortly ellipsoid and ca. 50—60 μm in diameter.

Some characters are of use in distinguishing certain species:

1) Fused filaments occur in only a single species, *R. monadelpha*.

2) In the subgenus *Lomurea* the stamens are exserted. In the other sections they reach about halfway, or slightly higher or lower up the perianth, and are not fully exserted.

3) In a few unrelated species of the subgenus *Romulea* (*R. aquatica*, *R. monadelpha*, *R. campanuloides*), as well as in *Lomurea*, the filaments are glabrous. In most species they are minutely pilose in their lower halves or at their bases, with soft, unicellular hairs which serve to protect the nectar excreted by the septal nectaries (de Vos 1971). In numerous species unicellular hairs are also formed from the inner epidermis of the perigone tube opposite the filaments.

4) While the stamens are generally erect and pressed against the style, they are incurved or circinnate in a few species, e.g. *R. komsbergensis*, *R. multifida* and *R. tetragona*, and somewhat patent in *R. aquatica* and *R. diversiformis*.

5) *R. flexuosa* is readily distinguished by its long, attenuate connectives which are elongated above the tips of the thecae.

6) In several species of the *Atrandrae* and *Aggregatae* the anthers are at first joined at their tips.

7) Brown or rust-coloured pollen occurs in *R. komsbergensis* and in the typical variety of *R. tetragona*.

8) Short anthers and long filaments distinguish *R. sulphurea*, a species known only from a single collection. Whether this is constant in this species is not known.

The anthers are generally orange-yellow, pale yellow, or cream in colour. In some species violet lines of dehiscence sometimes occur. In *R. komsbergensis* the anthers are at first violet and later become yellow, and in *R. atrandra* and *R. schlechteri* the colour of the anthers varies from black to violet or to yellow.

Pistil.—The shape of the small, glabrous ovaries ranges from obovoid to ellipsoid to almost globose (subsection *Aquaticae*). The shape varies somewhat within species, and this feature has therefore little diagnostic value. Three deeply bifid style branches are an almost constant feature of the genus, with the exception of *R. multifida* and *R. tortilis* var. *dissecta* which possess repeatedly split style branches, each branch bearing a small, terminal stigma. In a few more species a second splitting of one of the stigmatic branches has been observed as a rare anomaly, e.g. in *R. komsbergensis*.

Generally the stigmas are elongated, narrowly ligulate and channelled above, or conduplicate. They have a dense row of stigmatic papillae on their margins, as far as the bases of the style branches.

The two stigmas protruding between two anthers belong to adjacent carpels (de Vos 1971); that is, the style branch of each carpel with its two stigmas, is opposite an anther, as in Moraea. In some of the species with styles elongated above the anther tips, a slight tortion of the style may occur so that the stigmas appear to alternate with the anthers.

The length and width of the stigmas vary: in *R. tortuosa* var. *aurea*, for example, they are about 5 mm long, slender, and conduplicate; in many of the

small-flowered species, such as *R. obscura* and *R. pratensis*, etc., they are shorter and slightly wider, almost flat and ligulate, with obtuse tips. In *R. multifida* they are small and terminal. In some species variation occurs in their folding: when the flower opens for the first time, the stigmas are conduplicately folded, and as the flower ages, they flatten.

In most species the stigmas reach more or less up to the anther tips. *R. sabulosa* and *R. monadelpha*, however, have short styles, and the stigmas reach only about halfway up the anthers. In *R. diversiformis*, on the other hand, the stigmas overtop the anthers by several millimetres.

In a number of species the length of the style varies; for example, *R. tabularis*, *R. saldanhensis*, *R. tortuosa* var. *aurea*, and the typical variety of *R. rosea*, have forms with stigmas overtopping the anthers, and others with shorter styles and stigmas at, or below, the anther tips. Populations of *R. tabularis* near Stellenbosch with long styles were described as a distinct species, *R. duthieae*. In other localities the two forms, with long and short styles, occur together, and hybridisation experiments show that they are completely interfertile. There is no justification for separating the long-styled form as a distinct species.

In the typical variety of *R. rosea*, most specimens are long-styled, and this feature is valuable in distinguishing this variety from the other large-flowered varieties of *R. rosea*.

Capsules

The capsules are usually shortly cylindrical or ellipsoid, their length generally depending on the number of seeds set. In the *Aquaticae* and several of the *Tortuosae* the capsule is globose or subglobose or somewhat lobed. The dried pericarp varies from thin and almost papery to somewhat lignified.

The mature capsules generally split loculicidally soon after drying out. The only exceptions are *R. cruciata* and *R. eximia*, which have a more lignified, slightly beaked pericarp. Here dehiscence is retarded and often, in the following autumn, only short slits have appeared at the top of the capsule.

The behaviour shown by the peduncles, after flowering and on drying out, differs in several sections and species and is of some diagnostic value—see under Peduncles.

Seeds.—Seeds are numerous, globular or angled by pressure, and ca. 1—2 mm, or rarely up to 3 mm in diameter (*Aquaticae*). The testa is hard, light brown to dark brown, and almost smooth. In *R. setifolia* var. *belviderica* the seed-coat is somewhat sticky, even when dry. This is the only example of glutinous seeds among the South African romuleas.

CHROMOSOME STUDIES

The chromosomes of the South African species of Romulea have already been studied extensively. In 1965 I made a preliminary report on the chromo-

somes of 28 species, and Goldblatt (1971) gave the chromosome numbers of seven species, that for *R. hantamensis* (2n = 30) being a new record. For *R. sabulosa*, *R. minutiflora*, *R. flava*, and a variety of *R. rosea*, his counts correspond with mine, but they differ for specimens of *R. luteoflora* from Calvinia (*Goldblatt 277*, as *R. atrandra* var. *luteoflora*), and for a plant from Ceres (*Goldblatt 317*) referred to *R. triflora*. Perhaps an error was made in the identification of these plants.

In addition to the above, only five earlier reports on Romulea chromosomes have come to my notice. They are for three northern hemisphere species, *R. ramiflora* Ten. var. *gigantea* Bianca with 2n = 36 (Ricci, fide Cave 1963), for *R. bulbocodium* with 2n = 34 (fide Darlington and Wylie 1955), and for *R. requienii* with 2n = 34 (Contandriopoulos, fide Moore 1971). These are the only northern hemisphere species examined. Darlington and Wylie also list *R. parviflora* from South Africa (2n = c. 60), but what is meant by this epithet is uncertain, as several species have been named *R. parviflora* in herbaria. Gwynne (1958) gave chromosome counts of four South African species, obtained from root tips of germinating seeds. Two of the species he mentions are forms of the other two. For *R. rosea* and *R. ochroleuca* (a form of *R. rosea*) he gives 2n = 18, which corresponds with the numbers now obtained. But for *R. bulbocodioides* and for *R. latifolia* which is a form of the former, he gives 2n = 27 and c. 18 respectively. This differs from the number recorded in the present study, as well as by Goldblatt for *R. flava* (= *R. bulbocodioides*). Probably the seeds Gwynne used were not correctly identified. He did not say whether voucher specimens had been kept.

Method.—As few flowers are formed, meiotic divisions were not examined, and chromosomes were studied from root-tip squash preparations only. Plants, collected in the wild when flowering, were allowed to dry out and were stored till the next growing season, when their corms were either placed on wet sand, or fitted into holes bored in a sheet of perspex. This was supported over a basin of water, with the corms about 5 mm above the water level. Some of the sprouting roots were cut off when from 5 to 10 mm long, and pre-treated for three hours in a saturated aqueous solution of paradichlorobenzine, after which they were fixed overnight in acetic-ethanol (1:3) and stored in 70 per cent ethanol.

Staining of the chromosomes was not quite satisfactory. The Feulgen squash technique gave the best results, after hydrolysis in 1/N hydrochloric acid for 12 minutes at 60°C (de Vos 1965). As the staining was not very bright and the chromosomes very small, the preparations were examined under phase contrast.

The corms used were planted and when the plants flowered voucher specimens were made which were deposited in the STE herbarium.

The study of mitoses in pollen tubes was unsuccessful. Even after 20 hours of pollen tube growth, no chromosomes were found in the tubes, and after

another two hours only some badly stained chromosome clumps were observed.

Observations.—Together with the chromosome numbers previously recorded in the preliminary report and by Goldblatt, the chromosomes of 58 out of the 69 South African species of Romulea have now been examined.

The chromosome number of each species is given with the species description, and in Table 1 a summary is given of the chromosome numbers for each section and subsection. Some representative karyotype figures are shown in Fig. 3, as well as on p.142 of the preliminary report (de Vos 1965).

Table 1 shows that there is an almost complete aneuploid series of chromosome numbers ranging from 18 to 32, as well as a few higher numbers which are regarded as polyploid.

TABLE 1

Somatic chromosome numbers in the sections and subsections of *Romulea*. Numbers in parentheses rare.

Section	Subsection	No. of species	No. of species investigated	Somatic chromosome no.
Romulea	Ciliatae	21	15	24, (26, 28, 48, ca 44)
Romulea	Hirsutae	5	4	24, (ca 22)
Romulea	Aquaticae	2	2	24
Romulea	Minutiflorae	2	2	26, 50
Aggregatae	Amoenae	2	2	24
Aggregatae	Aggregatae	6	6	ca 30, 32, (ca 54)
Tortuosae	Tortuosae	3	3	30, (ca 32?)
Tortuosae	Longitubae	1	1	ca 32
Pratenses		1	1	44
Roseae	Autumnales	2	2	22
Roseae	Atrandrae	8	8	20, 22, (24)
Roseae	Campestres	3	2	22
Roseae	Roseae	2	1	18
Roseae	Cruciatae	2	2	18
Hirtae		2	2	26
Bicarinatae		4	4	26
Lomurea		2	2	20; 30 (Goldblatt 1971)
Stellanthe		1	—	

The chromosomes are small, ranging in their contracted state caused by the pretreatment in pdb, from less than 1 μm to 2,5 μm. In all the species examined there were generally one or two pairs, or sometimes three pairs, of long chromosomes in the complement, a few of medium length, and several small ones. In several species one or two of the larger chromosomes of the genome showed submedian centromeres and a number of the small chromosomes had median centromeres. In numerous chromosomes the centromere was not evident and these were probably acrocentric.



FIG. 3.

Mitotic metaphase chromosomes in species of *Romulea;* a, *R. saxatilis;* b, *R. namaquensis;* c, *R. hirsuta* var. *zeyheri;* d, *R. multisulcata;* e, *R. sinispinosensis;* f, *R. tortuosa* ssp. *depauperata;* g, *R. macowanii* var. *alticola;* h, *R. campanuloides;* i, *R. luteoflora;* j, *R. malaniae;* k, *R. rosea* var. *reflexa;* l, *R. rosea* var. *communis.*

In most species a satellite occurs, attached to one of the larger chromosomes. Sometimes the satellite seemed to be attached to its chromosome by a long, attenuate, almost invisible connecting thread only, and in a few cases the connection between satellite and chromosome seemed to be broken. This artifact could be responsible for the discrepancies sometimes found in the chromosome numbers of species of the *Tortuosae* and *Aggregatae*.

A correlation was found between chromosome number and chromosome size. For example, species with $2n = 18$ have from ten to fourteen chromosomes of the complement longer than 1,5 µm whereas species with $2n = 24$, possess four to eight chromosomes longer than 1,5 µm. The polyploid species have only eight out of more than 40 chromosomes of that length.

The karyotypes figured by Goldblatt for the *Romulea* species he examined do not agree with all the above findings. He found all the chromosomes to be acrocentric and varying in length from ca. 1 µm to not quite 2 µm and "of comparable size . . . although somewhat smaller in species with a high chromosome number". His method differed: he generally used microtomed sections of root tips which had been fixed in Craf, without pretreatment. The differences found in the karyotypes are probably due to different techniques employed.

The basic chromosome number for the genus is probably 12. This is based on the assumption that the subsection *Ciliatae*, which mostly has $2n = 24$, comprises the least specialised species in the genus. This assumption would mean that evolution has taken place in the genus by a progressive reduction, as well as by an increase in the chromosome numbers. This would also mean that species with fewer chromosomes than the basic number, and those with more chromosomes, are not closely allied, unless they evolved in a roundabout manner.

The idea that the basic chromosome number for *Romulea* is six, is improbable, as all the species examined would then be polyploid. Rather high basic numbers seem to be the rule in the Iridaceae, according to Goldblatt's findings.

Intraspecific polyploidy has been found only in *R. setifolia*, with $2n = 30$ and $2n =$ c. 54 (60?), and in *R. flava* var. *viridiflora* with $2n = 48$ whereas the other varieties of this species have $2n = 24$. As the polyploid *R. setifolia* is not morphologically different from the diploid, it has not been separated from the typical variety of the species, notwithstanding the presence of a reproductive barrier between the polyploid and diploid individuals.

In *R. flava* var. *viridiflora* the case is not quite clear. The count of $2n = 48$ is the only chromosome record for the variety and it is not known whether the variety as a whole is tetraploid. More study is needed here. The variety is at present separated from the typical variety on morphological grounds only.

Polyploidy has not given rise to an increase in plant size or in the size of any of its organs, except in the case of *R. sinispinosensis* which has somewhat larger

flowers and corms than the closely related *R. minutiflora*. The opposite is usually true, the polyploid species generally having rather small flowers.

The different chromosome numbers have been found to be correlated to some extent with the corm shape and splitting of the tunics at the corm base, as well as with certain anatomical features of the leaf, such as the amount of strengthening of the rib margins, the shape of the parenchymatic bundle sheaths, and to some extent also the size of the epidermal cells (Table 2).

TABLE 2

Relationship between chromosome number, corm type, and leaf anatomy in *Romulea*. O, cylindrical parenchymatic bundle sheath; U, incompletely cylindrical parenchymatic bundle sheath, U-shaped in transverse section. Chromosome numbers and symbols in parentheses rare.

Somatic chromosome number	Corm type	Leaf		
		Rib margins	Parenchymatic bundle sheath	Epidermal cells
24 (26, 28, c. 42) . . .	ciliata	unsclerified	O	large
24	hirsuta	unsclerified	O	large
24	amoena	unsclerified	O	±large
26 (c. 50)	spatulata	sclerified	U (O)	±large
30 (32)	tortuosa	unsclerified	O	large
30, 32, c. 54	aggregata	unsclerified	U (O)	large
44	pratensis	sclerified	U	large
22	autumnalis	sclerified	U	large to small
26	rosea	sclerified	U	small
22, 20, 18	rosea	sclerified	U	small (large)
18	cruciata	sclerified	U	small

NATURAL HYBRIDISATION

Natural hybridisation amongst the South African species of Romulea is apparently rare.

It probably takes place to some extent between *R. rosea* var. *australis* and var. *communis*. On the Stellenbosch flats, for instance, putative hybrids have been found (*de Vos 1593*, *1094*), which resemble artificial hybrids obtained after crossing these varieties. The collection *de Vos 291* is another morphological intermediate between these two varieties, from Kleinmond in the Caledon district.

In some of the south coastal districts where both *R. rosea* var. *reflexa* and var. *australis* occur, intermediates have been found which may be hybrids, e.g. *de Vos 2066* from Humansdorp, and *de Vos 2046* from the neighbourhood of Hermanus.

A possible putative hybrid between *R. cruciata* var. *intermedia* and *R. rosea* var. *communis* is *de Vos 1637* from between Stellenbosch and Paarl.

In the Kraaifontein area near Cape Town possible hybrids occur between

R. obscura var. *obscura* and var. *subtestacea*, with pollen from 50 to almost 100 per cent apparently normal (*de Vos 2240*, *2243*, *2244*). Some resemble the artificial hybrids obtained. Introgression between the hybrids and the parental entities probably also occurs.

A case of probable natural hybridisation (*Loubser 2176*) from near Porterville, Piketberg district, between *R. leipoldtii* and *R. tabularis*, has been brought to my notice by J. W. Loubser. The flowers of the hybrids are white as in *R. leipoldtii* and the perianth segments are marked on their backs as in *R. tabularis*. Here both parent species flower at the same time.

Possibly natural hybridisation may occur between *R. sabulosa* and *R. monadelpha* in the Nieuwoudtville area, Calvinia district. Artificial hybrids obtained between these species resemble *R. sabulosa* in their free filaments. Their perianths are intermediate in colour and markings, but this can be observed only in fresh specimens. Some of the herbarium specimens labelled *R. sabulosa* may perhaps be hybrids.

Whether hybridisation occurs naturally between *R. tortuosa* var. *tortuosa* and var. *aurea* is uncertain. Some of the plants in Salter's collection no. *3487* can be placed with var. *tortuosa* and some with var. *aurea;* and *de Vos 2100*, *2151* and *2218* consist of intermediates which may either be hybrids or may represent a part of the natural variation within the species.

In the present investigation only one putative hybrid has been given a name, namely *R.* × *vanzyliae*. This consists of two collections only, *Schmidt 341* and *BOL 24349*, the latter from a garden. They have a flower typical of *R. sabulosa* and the wide leaf of *R. subfistulosa*.

Three of the four hybrids named and described by Béguinot (1907a, 1909) proved to be distinct species. Under *R. ambigua* (= *R. rosea* × *R. hirsuta*, sec. Béguinot), he cited ten collections, six of which were examined during the present investigation. These fell within the normal range of variation of several species, namely of *R. hirsuta*, *R. cruciata* var. *intermedia*, *R. biflora*, and *R. montana*. Under each of his other hybrids he cited a single collection: the type collection of *R. hybrida* (= *R. sublutea* × *R. rosea*, sec. Béguinot) has been found to belong to *R. schlechteri;* that of *R. intermedia* (= *R. elegans* × *R. cruciata* var. *vulgaris* sec. Béguinot) is a variety of *R. cruciata* and shows no hybrid characters. His fourth hybrid, *R. dielsii* (= *R. hirsuta* × *R. cruciata*) is excluded—its holotype was probably destroyed in the last war and could not be found. Furthermore, crossing experiments that have been attempted, show that hybridisation between most of the reputed parental species of Béguinot's "hybrids" would be very unlikely.

The very rare occurrence of polyploidy shows that hybridisation, followed by chromosome doubling, played only a minor role in the evolution of the South African species of Romulea.

EXPERIMENTAL HYBRIDISATION

An experimental hybridisation programme was carried out among numerous of the South African species of Romulea, to determine the general trends of their breeding behaviour and to help in finding the interrelationships between species.

More than 400 experimental crosses were attempted. It soon became evident that crosses were generally unsuccessful between species considered on morphological grounds to be not closely related, and especially between species of different sections and with different chromosome numbers. Most of the experimental crosses attempted were therefore between species and varieties presumably allied, as well as between sympatric species or species from neighbouring localities, to find out whether reproductive barriers existed.

The crossing experiments were unfortunately hampered by a scarcity of material, as the mortality rate of plants collected in the veld while flowering was fairly high. In numerous species only one population, represented by a few plants, was available. Because of this shortage of material, the flowering period of the plants of numerous collections was often shorter than it normally would have been if more material had been available. This led to a further curtailment of the experiments.

Notwithstanding this, experimental hybridisations have been found valuable in several cases, as an aid, for instance, in determining whether two groups were taxonomically distinct or not.

Romulea is slightly protandrous. The pollen is ripe when the flower opens, and the stigmas become receptive on the second or third day of anthesis. Most of the species tested proved to be self-compatible and this further impeded crossing experiments. The anthers had to be removed some time before the flower bud opened, and progenies which were similar to the pistillate plant and had all, or almost all, their pollen grains stainable, were discarded as faults. It was found not worth while to search for meiotic chromosomes in the hybrids, as so few flowers are formed on a plant.

No apomyxis was found to occur in the few species tested for this.

Crosses between species from different sections

Most of the almost 40 intersectional crosses attempted were unsuccessful (Fig. 4). In most cases there was either no stimulation for the enlargement of the ovary, or the ovary enlarged to some extent, but the seeds were inviable. Generally the seeds had enlarged but were hollow and shrivelled on drying out, probably on account of the failure of endosperm development. In a few cases small, weak plants were obtained, which died off in the first growing season, without flowering.

Some interesting results were obtained in crosses between polyploids and between polyploids and selected diploids. For instance, crosses between the polyploid *R. pratensis* and the diploid *R. rosea* var. *australis*, produced hybrid plants with pollen from 75 to 95 per cent abortive. Numerous minute spores were formed, indicating that unpaired, lagging chromosomes occurred in the first meiotic division. (One hybrid plant tested showed the expected triploid chromosome number.) When *R. pratensis* was crossed with *R. rosea* var. *rosea*, several infertile hybrid plants were obtained with almost all their pollen abortive.

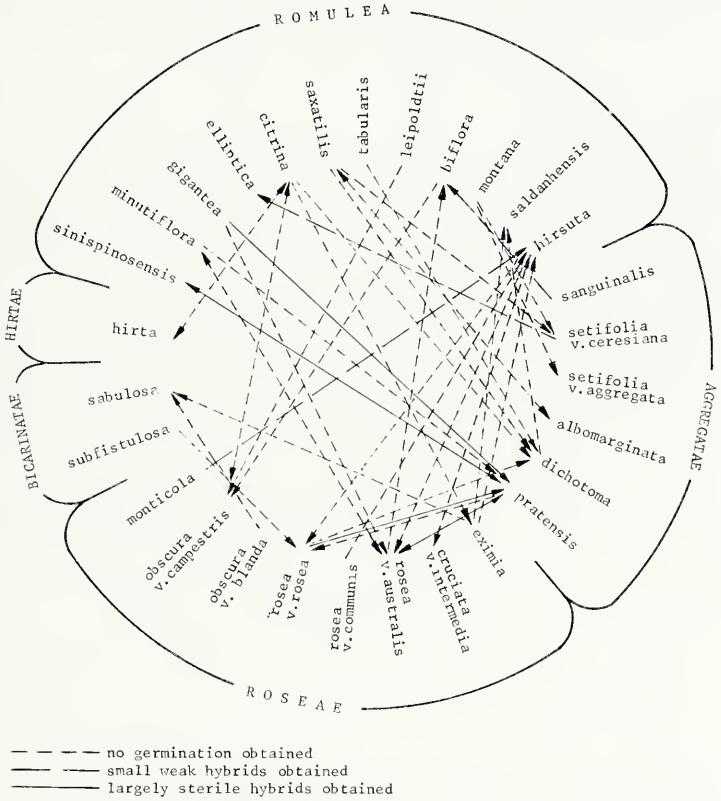


FIG. 4.
Diagram illustrating results of crosses attempted between species of the sections *Romulea*, *Aggregatae*, *Roseae*, *Bicarinatae*, and *Hirtae*. Arrows point to pistillate parents.

The reciprocal cross, with *R. rosea* as female parent, was unsuccessful. Perhaps the style of the latter was too long for the pollen tubes of the small-flowered *R. pratensis*.

As it was impossible to study the meiosis of the hybrids, more specific evidence that *R. rosea* var. *australis* might be one of the parent species of *R. pratensis* is lacking.

Only two hybrid plants were obtained in crosses between the polyploids *R. pratensis* and *R. sinispinosensis*, and several hybrids developed from crosses between the polyploids *R. pratensis* and *R. gigantea*. In both cases the pollen of the hybrids was almost 90 per cent abortive and large numbers of minute grains occurred, indicating abnormalities in the meiosis.

Crosses within sections

Section Romulea (Fig. 5)

Interspecific crosses. The only crosses attempted between different subsections of this section were between *R. sladenii* and *R. toximontana*, from subsections *Hirsutae* and *Ciliatae* respectively. These two species are endemic on the Gifberg, Van Rhynsdorp district. Small, weak hybrid plants were obtained, which died off without flowering. This shows the presence of an effective isolating mechanism between these sympatric species.

Within subsections *Ciliatae*, *Hirsutae*, and *Minutiflorae*, most of the attempted interspecific crosses were also unsuccessful. In the Minutiflorae no viable seeds were obtained between the diploid *R. minutiflora* and the polyploid *R. sinispinosensis*. This, however, cannot be regarded as proof that these two species are not closely allied—their very considerable morphological similarity shows that they must be allied.

Small, weak hybrid plants, which died off without flowering, were obtained in subsection *Hirsutae* between *R. sladenii* and *R. hirsuta* var. *cuprea*, as well as in subsection Ciliatae between *R. elliptica* and *R. flava*, and between *R. leipoldtii* and *R. tabularis*. Between *R. citrina* and *R. flava* a set of probable hybrids was obtained with 50 per cent obviously abortive pollen.

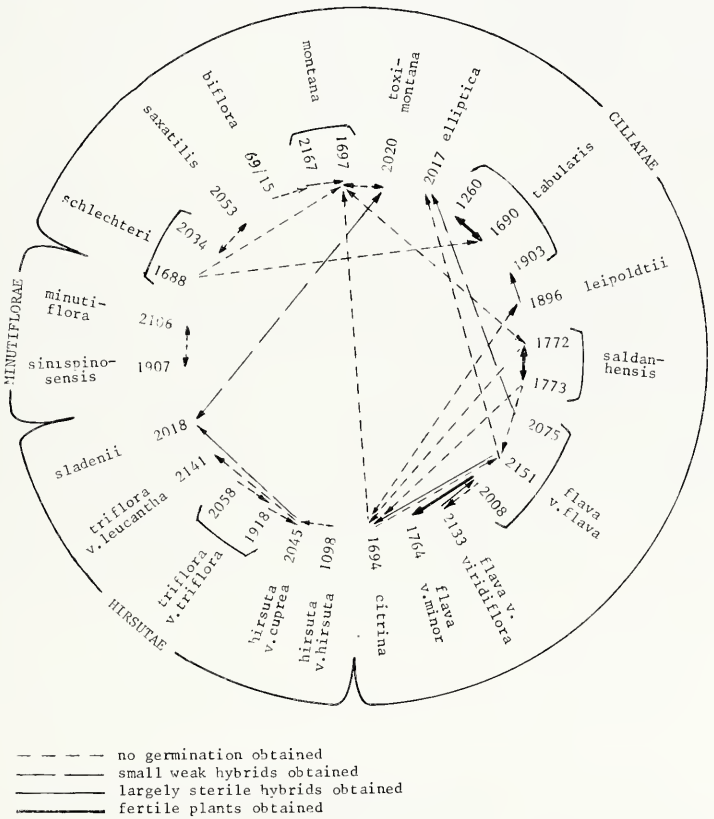
Intraspecific crosses. These varied. Crosses between plants from populations of *R. tabularis*, which differed in the lengths of their styles, produced highly fertile offspring with styles intermediate in length. This result does not uphold the placing of the long-styled forms in a distinct species, *R. duthieae*. Populations of *R. tabularis*, consisting of long and short-styled plants, were later found in the veld.

Similar results were obtained with crosses between long and short-styled forms of *R. saldanhensis*, from near Saldanha and Paternoster respectively.

On the other hand, crosses between morphologically almost similar populations of *R. montana*, one from Bidouw near Clanwilliam and the other from

the Calvinia district, produced only a few rather backward plants which have not yet flowered. Similarly, attempts to cross two populations of *R. triflora*, one from the Cape peninsula and the other from Darling in the Malmesbury district, were unsuccessful, no viable seeds being produced. No marked morphological differences occur between these two populations.

The results of crosses between varieties of *R. flava* were variable. Some intermediates were obtained between var. *flava* and var. *minor*, with up to 95



— — — — no germination obtained
——— ——— small weak hybrids obtained
——————— largely sterile hybrids obtained
——————— fertile plants obtained

FIG. 5.
Diagram illustrating results of crosses attempted between species of the section *Romulea*. Arrows point to pistillate parents.

per cent of apparently viable pollen. Reciprocal crosses between var. *flava* and tetraploid representatives of var. *viridiflora* (*de Vos 2144*) differed. With the diploid var. *flava* as pistillate plant, F_1 progeny was obtained with 45 per cent of abortive pollen grains. The reciprocal cross was unsuccessful, however.

Section Tortuosae

Very few crosses were attempted in this section. The results of crosses between *R. tortuosa* var. *tortuosa* and var. *aurea* were variable. In a few cases hybrid plants were obtained with 25 per cent abortive pollen. Only a few crosses could be attempted between var. *aurea* and var. *depauperata* and they were unsuccessful. Unfortunately no tests could be made between the latter and var. *tortuosa*, or between *R. tortuosa* and *R. austinii*.

Section Aggregatae

All the interspecific crosses attempted in this section were unsuccessful.

Intraspecific crosses. In 1967 several intraspecific crosses were made between plants of *R. dichotoma* with single basal foliage leaves, which is the typical state, and plants with two basal leaves, which, as they occurred further east, were suspected of possessing some genes of the Eastern Province species *R. longipes*. The progenies showed single basal leaves and were as fertile as progenies obtained from crosses between collections with single basal foliage leaves only.

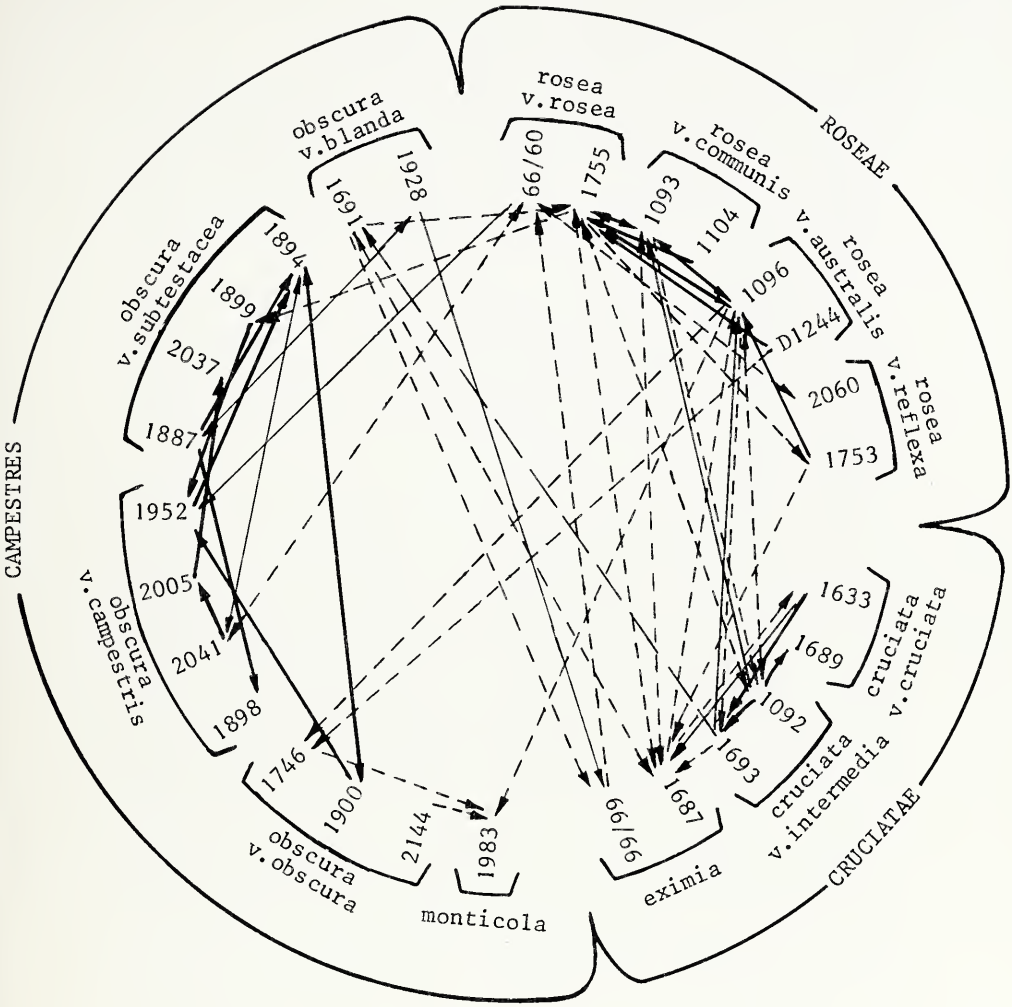
Populations belonging to *R. setifolia* were tested for interfertility. A population (*de Vos 2073*) from Belvidere, Knysna, which differs from the typical var. *setifolia* in the possession of glutinous seeds, was crossed with the typical variety. F_1 plants were readily obtained and had a very large proportion (about 90 per cent) of abortive pollen grains and no seed set. These two populations can therefore be said to belong to different ecospecies. As there is an effective isolating barrier between the Belvidere plants and plants of the typical variety, and as the former differ from the latter in having sticky seeds, they have been made a distinct variety, var. *belviderica*.

The results of reciprocal crosses attempted between *R. setifolia* var. *aggregata* and var. *ceresiana* were variable, but showed nevertheless that there is a not very effective reproductive barrier between populations of the two varieties.

Section Roseae (Fig. 6)

Interspecific crosses. Most of the crosses attempted between species of different subsections were unsuccessful, except for the following:

Between *R. obscura* var. *campestris* and *R. rosea*, with the former as pistillate plant, a few hybrid plants were obtained with from 50 to 90 per cent abortive



— — — — no germination obtained
——— ——— small weak hybrids obtained
——————— largely sterile hybrids obtained
═══════ fertile progeny obtained

FIG. 6.

Diagram illustrating results of crosses attempted between species of the section *Roseae*. Arrows point to pistillate parents.

pollen grains. In spite of this large proportion of inviable pollen, two capsules were formed with apparently normal seeds.

Between the sympatric *R. eximia* and *R. obscura* var. *blanda*, four hybrid plants were obtained with about 95 per cent abortive pollen grains and some minute grains, and with a considerable reduction in their fertility.

Both the above-mentioned crosses are between plants with different chromosome numbers (2n = 18 and 22).

Between *R. rosea* var. *australis* and *R. cruciata* var. *intermedia* hybrid plants were obtained with from 50 to 60 per cent of abortive pollen, and between *R. rosea* var. *communis* and *R. cruciata* var. *intermedia* a few hybrids were also obtained. In these two cases reciprocal crosses were unsuccessful.

Within subsection Cruciatae crosses between *R. eximia* and *R. cruciata* produced hybrid progeny with pollen from 30 to 45 per cent abortive and with reduced fertility.

Within subsection Atrandrae (not shown in figure) the interspecific crosses attempted between *R. atrandra* and *R. komsbergensis* were unsuccessful. After several unsuccessful attempts to cross *R. atrandra* and *R. luteoflora*, which differ mainly in their flower colours and chromosome numbers, hybrids with white flowers were obtained with about 50 per cent abortive pollen and greatly reduced fertility. One of the hybrids tested showed 21 chromosomes, i.e. intermediate between the chromosome numbers of the parent species. Some F_2 hybrids were obtained, some with 21 chromosomes and others with 22. The reciprocal cross, with *R. atrandra* as pistillate plant, was unsuccessful. As these two taxa differ in chromosome number and flower colour, and as there is usually an effective isolating mechanism present between them, *R. luteoflora*, which was at first described as a variety of *R. atrandra*, has been made a distinct species.

Intraspecific crosses. Most of the crosses attempted between the different varieties of *R. obscura* were successful, producing intermediates with from 10 to 50 per cent abortive pollen and with a slight reduction in their fertility (Table 3). In several cases F_2 progenies were also raised, with a slightly lower proportion of abortive pollen. This, as well as the numerous instances of intermediates occurring in the wild, shows that isolating mechanisms between the varieties of *R. obscura* are incomplete; for this reason the different taxa are considered to be varieties of one large, polymorphic species, notwithstanding differences in flower size and colouring.

Crosses between varieties of *R. rosea* produced almost similar results, also showing an incomplete genetic isolation between the varieties.

Crosses between the two varieties of *R. cruciata* produced a progeny with from 5 to 50 per cent abortive pollen grains and somewhat reduced fertility.

Within the subsection Atrandrae, intraspecific crosses between *R. atrandra*

var. *esterhuyseniae* and var. *atrandra* (not shown in figure) produced in 1969 a large number of plants, only one of which has flowered as yet.

TABLE 3

Artificial crosses attempted between *Romulea obscura* varieties. Arrows point to female parent.

Parent varieties	F_1			F_2		
	Cross	Pollen % normal	Seeds	Cross	Pollen % normal	Seeds
obscura ← *subtestacea*	66/38	24	few			
obscura → *subtestacea*	66/35	44–66	numerous	68/62		few
campestris ← *obscura*	66/33		numerous	68/59	95–100	numerous
campestris → *subtestacea*	67/11	30–50	numerous			
campestris ← *subtestacea*	66/36	50–70	numerous	68/63	(one flower)	none
campestris ← *subtestacea*	66/32	45–50	numerous	68/58	55	numerous
campestris → *subtestacea*	66/34	95	numerous	68/60	60–100	numerous
campestris ← *subtestacea*	68/46		numerous			
campestris ← *blanda*	68/45		numerous			
campestris ← *blanda*	69/44					
subtestacea ← *blanda*	69/42	65	numerous			
subtestacea → *blanda*	69/43					

Section Bicarinatae

The only hybridisations attempted in this section were between the sympatric species *R. sabulosa* and *R. monadelpha*. Vigorous hybrids were readily obtained which were intermediate between the parent species in flower colouring, but resembled *R. sabulosa* in their free stamens, whether the crosses were made with *R. sabulosa* or with *R. monadelpha* as pistillate plant (de Vos 1970a). The pollen of the hybrid plants was from 40 to 75 per cent apparently viable, and 12 to 30 seeds per capsule were produced by the hybrids after artificial pollinations. From these a number of F_2 hybrids were obtained, two of which flowered last year. Baker's placing of *R. monadelpha* in a distinct subgenus, because of its fused filaments, is not substantiated by this experimental evidence.

PHYLOGENY

The following views on the evolution of the South African sections of the genus are based on the morphological, anatomical, and cytological findings, supplemented by the results obtained from hybridisation experiments.

Section Romulea

The section *Romulea* comprises 30 species in South Africa, representing more than 40 per cent of the South African species. Together with the species

of the northern hemisphere, most of which probably also belong to this section, it accounts for the majority of species of the genus.

The South African part of the section generally has 24 somatic chromosomes, with only a few exceptions in the subsection *Ciliatae* (e.g. *R. toximontana* and the polyploid *R. gigantea*) and in the two species of the subsection Minutiflorae.

Subsection *Ciliatae* comprises 21 species, distinctly related by their similar corms, stems capable of elongating, and leaves usually with little sclerenchyma and rather large epidermal cells. Only three species, all from Namaqualand, have larger amounts of sclerenchymatic tissue in their leaves. This subsection contains the most primitive species of the genus, showing a combination of unspecialised features such as obliquely flat-based corms with crescent-shaped basal ridges, frequently elongating stems, flowers with short perianth tubes, and leaves usually with cylindrical parenchymatic bundle sheaths and small sclerenchymatic sheaths around the vascular bundles, with large, relatively thin-walled epidermal cells, and generally without sclerenchyma in the rib margins.

Lewis (1954) also considered the flat-based type of corm and elongated stem to be more primitive than the globose corms and abbreviated axes of other sections of the genus.

All the other South African species are probably derived from this subsection along several divergent lines of evolution, and accompanied by an increase or a decrease of chromosome numbers.

Subsection *Hirsutae* is closely allied to the Ciliatae and evolved without a change in chromosome number. Its corm is more specialised in being bell-shaped and symmetrical. The five species of the subsection are closely allied.

Subsection *Aquaticae*, comprising two species, also evolved without a change in chromosome number. Its leaves are specialised in the possession of more than four stomatiferous grooves, probably to increase the transpiration rate as a response to its aquatic habit.

Subsection *Minutiflorae* comprises a widespread diploid species and a polyploid species with, seemingly, a very restricted range of distribution. The diploid, *R. minutiflora*, probably originated from the *Ciliatae* by an increase in the chromosome number to $2n = 26$, accompanied by a change in the shape of the corm and a reduction in the size of the plant and its organs. This species is without doubt one of the parental species of the tetraploid *R. sinispinosensis*. Its other parent is probably a species of subsection Ciliatae. There is no indication that the tetraploid is a recent autotetraploid: almost all its pollen grains are apparently normal and of equal size, showing that its meiosis is normal or almost so. All its organs are slightly larger than in the diploid. This is the only instance in Romulea where polyploidy is accompanied by an increase in the size of the plant.

Section Tortuosae

The two subsections of the *Tortuosae* are allied and probably originated from the same ancestral *Ciliatae*, with an increase in the chromosome number to 2n = 30 and 32. The two species *R. montana* and *R. austinii* form morphological links between the *Ciliatae* and the *Tortuosae*.

The similarities in certain morphological features in the subsections *Tortuosae* and *Longitubae*, such as their short stems incapable of elongating, corms with a wide, almost vertical, basal ridge, bracts and bracteoles which are somewhat membranous in the lower halves, and their yellow flowers, as well as the similar chromosome numbers, indicate their relationship. They differ in some important features and probably diverged fairly early in their evolution. In the *Tortuosae* evolution was accompanied by a reduction of the upper unifacial part of the leaf and an elongation of the bifacial part, as well as by a widening of the basal ridge of the corm. The more advanced *Longitubae* evolved by an elongation of the perianth tube and a reduction of the peduncle length.

There is no indication in their morphology that the section *Tortuosae* is closely related to the section *Aggregatae*, part of which also has 2n = 30 and 32. These two sections probably evolved independently.

Section Aggregatae

The two subsections included in this section are perhaps not very closely related. Subsection *Aggregatae* has a wide range but does not occur in the extreme south-western Cape. It is a natural group of six species with identical corm structure and almost similar, or possibly quite similar, chromosome numbers. It probably evolved from the *Ciliatae*, differing from the latter mainly in the corm tunics which split into small fibral clusters on the basal ridges of its corms and in its higher chromosome number.

Subsection *Amoenae*, comprising two rare species with a very restricted range in the Calvinia district, has the same chromosome number as the *Ciliatae* and may perhaps stand nearer this group than subsection *Aggregatae* does. Its relationship with the latter is not clear, because of the difference in chromosome numbers. Its inclusion in section *Aggregatae* rests on morphological grounds: for example, the splitting of the tunics at the corm base is similar to that of subsection *Aggregatae*. *R. sanguinalis* of subsection *Amoenae* is a morphological link between the two subsections, joining the campanulate corm of *R. amoena* and the oblique corms of subsection *Aggregatae*.

Section Pratenses

R. pratensis has been placed separately in its own section. It is a polyploid, with indications of being an allopolyploid (hardly any abortive pollen grains, all grains of equal size, and large numbers of viable seeds produced). It shows

some affinity with the *Roseae* and the *Minutiflorae* and could perhaps have originated from the two diploids *R. rosea* var. *australis* and *R. minutiflora*, which have 2n = 18 and 2n = 26 respectively. This view is based on the somewhat similar appearance of the three species, the corm and flowers of the tetraploid appearing to be intermediate between those of the two diploids, and also on the fact that the chromosome number of the tetraploid can be derived from those of the two diploids. But attempts to cross the diploids were unsuccessful, perhaps because the small size of the flowers made it difficult to remove the stamens without contaminating the stigmas with their own pollen. However, the cross between *R. pratensis* and *R. rosea* var. *australis* produced infertile triploid hybrid plants (see under Experimental Hybridisation).

The corm of *R. pratensis* is somewhat similar to that in section *Aggregatae*, but the species is not closely allied to this section and is kept separate.

Section Roseae

The five subsections of section *Roseae* form a homogeneous morphological group and show a decreasing aneuploid series of chromosome numbers. The subsections probably originated from the same or closely related ancestors.

The subsection *Autumnales* which has only two chromosomes less than the *Ciliatae*, is the least specialised of the *Roseae*, the small basal ridge of its corm showing its relationship with the *Ciliatae*. Evolution probably proceeded from this to subsection *Campestres* which also has 2n = 22; next, by a further decrease of the chromosome number, to subsection *Roseae* and, ultimately, to the *Cruciatae*. The latter two subsections, both with 2n = 18, are closely allied, and differ mainly in the shape of their corms. The obovate corm with a pointed base, found in the *Cruciatae*, undoubtedly evolved from the globose corm of subsection *Roseae*.

Although they differ in chromosome number, the subsections *Roseae* and *Campestres* are morphologically very similar, except for their flower colours (white to magenta-pink in the *Roseae* and yellow to apricot in the *Campestres*), and the degree of curvature shown by the dry peduncles bearing the mature capsules (fairly straight in the *Roseae*, and flexuose or curved from their bases and patent in the *Campestres*).

Probably the subsection *Atrandrae* (2n = 20, 22 and rarely 24) does not belong to the same phylogenetic line and represents a divergent evolutionary line, possibly from the same ancestors. It has been included with the *Roseae* on account of its remarkably similar morphology: some herbarium specimens can hardly be placed unless an anatomical examination of the leaves is made. A few species of the *Atrandrae* show more advanced features than species of subsection *Roseae*, such as a multifid style in *R. multifida* and, in *R. diversiformis*, a difference in the shape of the outer and inner perianth segments. *R. malaniae*

and *R. membranacea*, both probably with 2n = 24, are somewhat aberrant in their leaf structure, and *R. membranacea* in its corm structure as well. They may be old relic species in which the basic chromosome number has been retained.

Sections Hirtae and Bicarinatae

In their short, abbreviated stems, leaves with large sclerenchymatic bundle sheaths and reduced parenchymatic sheaths, and globose corms, sections *Hirtae* and *Bicarinatae* are almost similar to section *Roseae*. They differ from the *Roseae* in being hyperploid with 2n = 26 chromosomes, and they are probably not closely related to the *Roseae*. The almost similar habit of the species in the three sections probably evolved along divergent lines. In the *Hirtae* the leaf has become specialised by a reduction of the lateral ribs and a widening of the median ribs to form longitudinal wings, and in the *Bicarinatae* the bract, bracteole, and flower are specialised, the end result being *R. monadelpha* with its fused filaments.

Subgenus Lomurea

Three species with long perianth tubes, which show the vegetative features of *Romulea* and the flower shape of the genus *Syringodea*, are placed in a distinct subgenus under *Romulea*, as they appear to stand nearer this genus than to *Syringodea*. Probably this subgenus and *Syringodea* represent two independent evolutionary lines from *Romulea* proper.

R. stellata which differs from the other two species in several features is placed in a separate section *Stellanthe*. It has retained some of the more primitive features, such as a ciliata corm type and a leaf structure which is linked with this type of corm. But its long perianth tube and its often single foliage leaf show its derived nature.

The other two species are almost alike in habit, differing mainly in the length of their perianth tubes and in corm shape. The different chromosome numbers found (2n = 30 for *R. hantamensis*, fide Goldblatt 1971, and 2n = 20 for *R. syringodeoflora*) cannot be explained, except that some error may have occurred in determining the number in either the one or the other species. Further study is needed, but this could not yet be undertaken because of a lack of suitable material for study. It is unlikely that *R. hantamensis* is triploid, as its pollen grains are of equal size and almost all stainable and apparently normal.

The species of this subgenus are not closely allied to the other two species which also possess long perianth tubes, namely *R. macowanii* and *R. kamisensis*.

GEOGRAPHICAL DISTRIBUTION

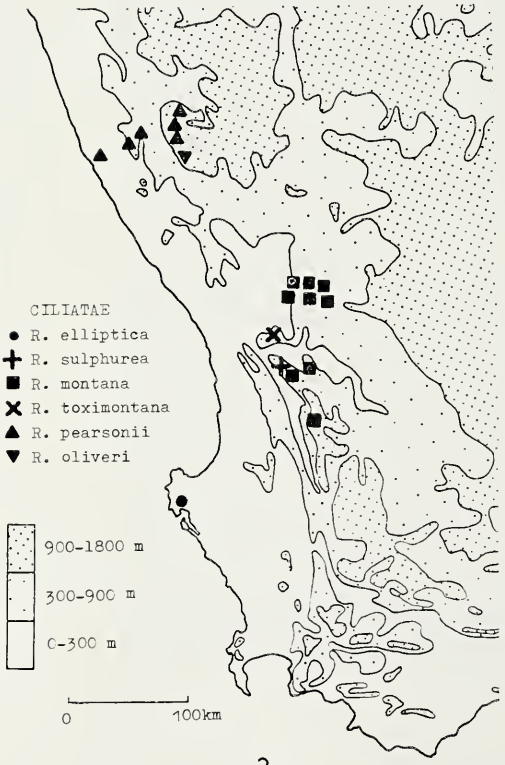
The genus Romulea has two frequency centres: (i) in countries around the Mediterranean Sea, with some species extending to the Atlantic coast of the


CILIATAE
R. schlechteri
R papyracea
R. flexuosa
R. vinacea

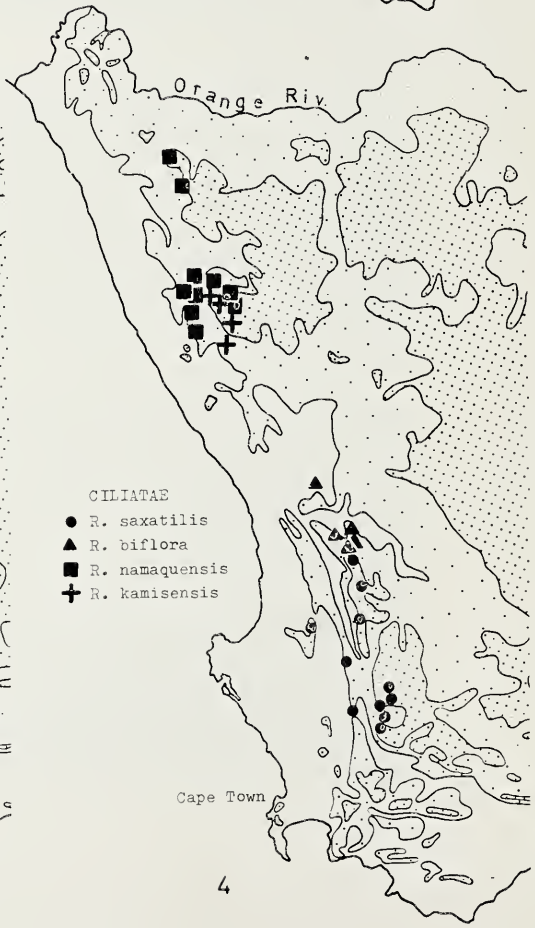
1


CILIATAE
R. tabularis
R. leipoldtii

2


CILIATAE
R. elliptica
R. sulphurea
R. montana
R. toximontana
R. pearsonii
R. oliveri
900-1800 m
300-900 m
0-300 m
0
100km

3


Orange Riv.
CILIATAE
R. saxatilis
R. biflora
R. namaquensis
R. kamisensis
Cape Town

4

Iberian peninsula and of France, to the Canaries, the Azores and to Socotra, and one species to southern England; (ii) in the south-western Cape Province of South Africa, from Calvinia to Caledon, with a number of species ranging northwards to Namaqualand, and others eastwards to East London and the Drakensberge.

These two centres are connected by a small number of species (about six) with a discontinuous distribution, on the mountains of eastern Africa, from the Drakensberge in South Africa to Ethiopia.

Almost two-thirds of all Romulea species occur in South Africa. Not one of the South African species has been found in the northern hemisphere, and only one species, *R. campanuloides*, extends beyond the northern border of the Republic. This is the most widespread species in southern Africa and ranges from the southern extremities of the Drakensberge, along the eastern African mountain ranges, to the equator (Map 14).

All the southern African species are subjected to alternating wet and dry periods. Most species are concentrated in areas with a predominantly winter rainfall (Calvinia to Caledon). A few of these grow where the soil becomes waterlogged and marshy in winter (e.g. *R. tabularis*), and two species are seasonal aquatics (*R. aquatica* and *R. multisulcata*). Several occur in the southern and south-eastern coastal districts where the rainfall is more or less spread throughout the year (*R. dichotoma*, *R. longipes*, *R. autumnalis*, *R. pratensis*). *R. campanuloides* and *R. macowanii* grow in summer rainfall areas (Cape midlands and Drakensberge), and several species, e.g. *R. austinii*, *R. hirta*, *R. tortuosa* and *R. sphaerocarpa*, occur in the western Karoo or karooid areas where they are often subjected to long periods of severe drought.

Romuleas occur in all types of soil, from heavy clay or stony ground to almost pure sand.

Several wide-spread species, e.g. *R. minutiflora*, *R. setifolia*, *R. rosea* and *R. atrandra*, do not seem to be limited by either altitude, rainfall period, or edaphic conditions. Some, e.g. *R. macowanii*, *R. campanuloides*, *R. hallii*, *R. komsbergensis*, *R. syringodeoflora* occur only on plateaux and mountain ranges at altitudes above 1 500 metres. Others, e.g. *R. dichotoma*, *R. eximia*, *R. obscura* and *R. saldanhensis*, occur only in coastal districts below the first mountain barriers, at altitudes from sea level to about 100 metres.

Table 4 shows the number of *Romulea* species of each section and subsection in the magisterial districts of South Africa.

The section *Romulea*, the only section occurring in both the southern and northern hemispheres, is represented in South Africa by four subsections. The large subsection *Ciliatae*, which is probably the least specialised in the genus, is concentrated in the south-western and western Cape districts, with species extending from Namaqualand to Riversdale, and with one species,

Maps 1–4.
Geographical distribution of species of subsection *Ciliatae*.

Table 4

Number of species of the different sections of *Romulea*, recorded from the various Cape magisterial districts and adjoining regions. A—western, coastal and inland, districts; B—south-western inland districts; C—south-western districts below first escarpment; D—southern districts below first escarpment; E—southern inland distriets; F—south-eastern districts; G—inland regions.

Regions		*Subgenus Romulea*							*Subgenus Lomurea*		Total
		Romulea	*Tortuosae*	*Aggregatae*	*Pratenses*	*Roseae*	*Bicarinatae*	*Hirtae*	*Lomurea*	*Stellanthe*	
	Number of species in each section	30	4	8	1	17	4	2	2	1	69
A	Namaqualand	7	1	—	—	1	—	—	—	—	9
	Vanrhynsdorp—Vredendal	8	—	—	—	3	—	—	—	—	11
	Calvinia	7	2	3	—	6	3	1	1	—	23
	Clanwilliam	15	1	—	—	7	1	2	—	1	27
	Sutherland	—	1	1	—	6	1	2	1	—	12
B	Tulbagh	4	—	1	—	3	—	—	—	—	8
	Ceres	5	2	2	—	3	—	1	—	—	13
	Worcester	5	2	1	—	4	—	—	—	—	12
C	Piketberg	10	—	—	—	4	—	—	—	—	14
	Vredenburg, Hopefield	8	—	—	—	3	—	—	—	—	11
	Malmesbury	8	—	—	—	4	—	—	—	—	12
	Cape, Bellville	7	—	—	—	4	—	—	—	—	11
	Paarl, Wellington	4	—	—	—	2	—	—	—	—	6
	Stellenbosch, Somerset W.	7	—	—	—	3	—	—	—	—	10
	Caledon, Hermanus	8	—	2	—	4	—	—	—	—	14
D	Bredasdorp	4	—	1	—	4	—	—	—	—	9
	Swellendam, Heidelberg	3	—	2	—	1	—	1	—	—	7
	Riversdale	3	—	2	—	4	—	—	—	—	9
	Mossel Bay	1	—	2	—	2	—	—	—	—	5
	George	—	1	3	—	1	—	—	—	—	5
	Knysna	1	—	3	—	2	—	—	—	—	6
	Humansdorp	1	—	3	—	2	—	—	—	—	6
E	Robertson, Montagu	2	2	—	—	2	—	—	—	—	6
	Laingsburg	1	2	—	—	2	—	1	—	—	6
	Ladismith	1	—	1	—	1	—	—	—	—	3
	Prins Albert	1	1	1	—	—	—	—	—	—	3
	Oudtshoorn	1	—	—	—	1	—	—	—	—	2
	Uniondale	1	1	1	1	1	—	—	—	—	5
	Willowmore	1	—	—	—	—	—	—	—	—	1
	Uitenhage	—	—	1	1	1	—	—	—	—	3
F	Port Elizabeth	1	1	2	1	2	—	—	—	—	7
	Alexandria, Albany	1	1	1	1	1	—	—	—	—	5
	Bathurst, East London	1	—	1	—	1	—	—	—	—	3
G	Karoo and Eastern Cape Midlands	—	1	—	—	2	—	—	—	—	3
	O.F.S., Lesotho, Natal and farther north	—	1	—	—	1	—	—	—	—	2

R. gigantea, extending to Bathurst (Maps 1–6).The greatest concentration of its species is in the Clanwilliam area. Four species (*R. schlechteri*, *R. tabularis*, *R. leipoldtii*, *R. flava*) are widespread, and eight have a very local distribution, (*R. papyracea*, *R. elliptica*, *R. sulphurea*, *R. vinacea*, *R. toximontana*, *R. kamisensis*, *R. oliveri*, *R. barkerae*).

The small subsection *Hirsutae*. with five species, is less widely distributed, ranging from Van Rhynsdorp to Caledon (Maps 7, 8). *R. minutiflora*, one of the two species of the small subsection *Minutiflorae*, has almost the widest area for a species in South Africa, from Calvinia to Albany (Map 9) and from sea level to an altitude of 1 000 metres on the Koue Bokkeveld and the escarpment around Nieuwoudtville. The two species of subsection *Aquaticae* have a discontinuous distribution in seasonal pools in some of the western coastal districts and in the Calvinia district (Map 8).

The large section *Roseae* also has its greatest concentration of species in the Clanwilliam area and ranges over almost the whole area for *Romulea* in the Cape Province. Three of its subsections, the *Rosea*, *Cruciatae*, and *Campestres*, are concentrated in the south-western coastal districts (Maps 17–20). The weed *R. rosea* var. *australis*, often occurring along roadsides, has become naturalised in Australia, Tristan da Cunha, and St. Helena.

The area of the subsection *Autumnales* is in the eastern Cape Province and on the east African mountains as far as the equator (Map 14); the subsection *Atrandrae*, with its highest concentration of species in the Sutherland district, has a wide, mostly inland area from Namaqualand to the eastern Cape Province (Maps 15, 16). Both these subsections are excluded from the western Cape Province proper, i.e. the Cape Peninsula and neighbouring districts below the first mountain barrier.

Several of the more specialised sections, as well as the small subgenus *Lomurea*, are also excluded from the western Cape Province below the first mountain ranges. These are the sections *Hirtae*, *Bicarinatae*, *Tortuosae*, and *Aggregatae* from the western and south-western inland districts (Maps 21, 22, 10–13); the last named also extends into the southern and south-eastern districts as far as East London (Maps 10, 11), and the subsection *Longitubae* of the *Tortuosae* has a wide range in the eastern districts and Lesotho (Map 13).

The subgenus *Lomurea*, with three species, has a discontinuous distribution in the districts of Calvinia, Sutherland, and Clanwilliam, at altitudes from 1 000 to 1 600 metres (Map 23).

In almost every section or subsection of the South African part of the genus there are one or more species with a limited area. A few occur in coastal districts at low altitudes of less than 100 metres, namely *R. papyracea* (Cape peninsula), *R. eximia* (Malmesbury), *R. elliptica* and *R. barkerae* (Vredenburg), and *R. sinispinosensis* (Vredendal).

Most of the local endemics occur on inland mountains and high plateaux of the western and south-western Cape, generally where there are isolated outliers of the Cape flora, e.g. *R. kamisensis*, *R. oliveri* (Kamiesberge, Namaqualand), *R. hantamensis* (Hantamberg, Calvinia), *R. monticola*, *R. multisulcata*, *R. sanguinalis* (Bokkeveld plateau, Calvinia), *R. sladenii*, *R. toximontana* (Gifberge, Van Rhynsdorp), *R. vinacea*, *R. cedarbergensis*, *R. sulphurea* (Cedarberge, Clanwilliam), *R. hallii*, *R. multifida*, *R. komsbergensis* (Sutherland), *R. sphaerocarpa*, *R. malaniae* (Hex River mountains, Worcester), and *R. jugicola* (Kamanassieberge, Klein Karoo).

Although some of these endemics with a restricted range are undoubtedly relics, a large number are probably more recent derivatives from closely allied, less specialised species, e.g. *R. monadelpha* from *R. sabulosa*, *R. sphaerocarpa* from *R. tortuosa*, *R. kamisensis* from *R. namaquensis*, *R. hallii* from *R. atrandra*, and *R. multifida* from *R. komsbergensis*.

There are two hypotheses about the place of origin of the genus: Engler (1908) and Béguinot (1909) were of the opinion that the genus originated in the south-western Cape and spread northwards along the mountain ranges of East Africa. The second hypothesis is that the genus originated in the northern hemisphere or in tropical Africa and migrated to the Cape, more or less as Adamson (1948) postulated for the genus Erica.

The present investigation cannot throw much new light on this problem, as a detailed study has not yet been made of the northern species. The following data which may have some bearing on the problem seem to point in opposite directions:

1) The greatest concentration of *Romulea* species in South Africa occurs in the western inland districts of Calvinia with 23 species, and Clanwilliam with 27 species (Table 4). According to Levyns (1964), a genus with its highest concentration of species in Clanwilliam or farther north belongs to the Karoo flora, whilst a genus with most of its species in the Caledon or Worcester areas belongs to the Cape flora. If this supposition is accepted, then *Romulea* belongs to the Karoo flora which, according to Levyns, came from the north. In this it differs from the genus *Ixia* which has its highest number of species in the Caledon district (Lewis 1962). However, the place of highest species concentration is not necessarily the place of origin of the genus.

2) The least specialised part of the genus in South Africa is probably the subsection *Ciliatae* of the section *Romulea*. This is concentrated in the south-western and western Cape province, while the more specialised South African sections are excluded from the south-western Cape. All species of the northern hemisphere which I was able to examine cursorily, are seemingly closely allied to subsection *Ciliatae* and can be placed in a distinct subsection *Romulea* (as it contains the type species of the genus) of section *Romulea*.

Subsection *Romulea* is probably not more primitive than subsection *Ciliatae*. Chromosome counts have been made of only three northern hemisphere species and they have higher numbers than the *Ciliatae* (see under Chromosome Studies). Moreover, subsection *Romulea* has at least one specialised feature, namely the occurrence of subepidermal fibre bundles in the rib margins of the leaves. These facts point to a southern origin of the genus.

Until a detailed cytological study has been made of the northern species, the question about the place of origin of the genus remains open.

In South Africa the genus has become much more diversified and specialised than in the northern hemisphere, and several specialised structures have evolved which have no counterpart in any of the northern species, such as (i) several corm types, (ii) leaves with a reduction of the lateral leaf ribs, or an increase of the stomatiferous grooves or, more rarely, a lignified epidermis, and (iii) flowers with a salver-shaped perianth, an elongated perianth tube, a multifid style, or fused filaments.

At the Cape the genus has also given rise to a second subgenus *Lomurea*, and to the small genus *Syringodea*; and it has probably given rise to the genus *Crocus* in the northern hemisphere.

TAXONOMIC HISTORY

The name of the genus

The genus *Romulea*, established in 1772 by Maratti, was conserved against Adanson's *Ilmu* (1763) at the International botanical Congress held in Vienna in 1905.

In the pre-Linnaean era a species of *Romulea* was assigned to the genus *Crocus* by several authors, and to *Sisyrinchium* by others. Tournefort (1703) was the first to place species of *Romulea*, together with some other species, in a distinct genus, *Bulbocodium*, a name also adopted by Ludwig (1737). But later in the same year Linnaeus used the latter name for a genus of the Liliaceae. See further Béguinot 1909 p. 185–187 for a more detailed review of the pre-Linnaean literature.

Linnaeus at first (1753, 1759) assigned a species of *Romulea* to the genus *Crocus*, and later to *Ixia* (1762, 1770), and in this he was followed by most workers in the eighteenth and early part of the nineteenth centuries.

As the name *Bulbocodium* was no longer available for species of *Romulea*, Adanson (1763) established the genus *Ilmu*, citing *Bulbocodium* Tourn. and *Sisyrinchium* Col. as synonyms and giving a very short and rather inexact description (. . . "feuilles en canal demi-cilindrique").

In a small and rare work, Maratti, in 1772, described the genus *Romulea* for species growing in the neighbourhood of Rome, which he considered to be distinct from *Crocus*, *Colchicum*, *Sisyrinchium*, *Bulbocodium*, and *Ixia*. He was

probably not aware of the name *Ilmu* established nine years earlier.

Ker (1802) described the genus *Trichonema* in Curtis's Botanical Magazine for species of *Romulea* which were at that time still known in England as *Ixia*, also unaware of the names *Ilmu* and *Romulea* given them on the continent. The name *Trichonema* was used by several authors up to 1868, e.g. by Aiton (1810), Sprengel (1830), Reichenbach (1830–32), Harvey (1868), etc.

The second worker to make use of the name *Romulea*, so saving it from oblivion, was Persoon (1805), who used it to distinguish a section of the large, still heterogeneous genus *Ixia*. He cited seven species under the section *Romulea*, five of which were true romuleas. In 1818 Sebastiani and Mauri, in their "Florae Romanae Prodromus", used the name *Romulea* as genus name, and they were followed by Ecklon (1827), Baker (1877), who definitely reinstated the genus *Romulea*, Klatt (1882), Bentham and Hooker (1883), Pax (1888), Baillon (1894), and others.

In 1891 Kuntze unsuccessfully tried to reinstate the name *Bulbocodium* for *Romulea*, his reason for this being that Ludwig's work of 1737 slightly predated that of Linnaeus of the same year.

By 1905 the name *Romulea* was in such general use that it was conserved against the older name *Ilmu*.

In "The British Flower-Garden" of 1829, Sweet described the genus *Spatalanthus* for a *Romulea* species from the Cape, with fused filaments. He considered this to be sufficiently distinct from *Romulea* to be placed in a separate genus. Pax (1888) included this genus with *Romulea*, after Bentham and Hooker had drawn attention to the fact that *Spatalanthus* seemed very similar to species of *Romulea*.

The position of the genus in taxonomic systems

In contrast to Linnaeus, who had placed genera of the Iridaceae in the Triandria Monogynia, together with widely divergent genera possessing three stamens, Adanson (1763) already showed an understanding of the Iridaceae as a separate group. His section *Irides* of his family Liliaceae comprised mostly genera of the Iridaceae. In this section he also placed his new genus *Ilmu*.

The first worker, to my knowledge, to subdivide the family into orders or tribes was Reichenbach (1828) who, in a small work, divided the Irideae into the groups *Ferrarieae*, *Gladioleae*, and *Ixieae*. In the latter group he placed *Galaxia*, *Trichonema*, *Crocus*, *Ixia*, etc. He was followed a year later by Dumortier (1829), who divided the family into five tribes, placing *Trichonema* in the *Ixiea*, and *Crocus* in its own tribe, *Crocineae*.

Klatt (1865–66) who, in his Revisio Iridearum, divided the family into five suborders, followed Reichenbach in placing *Trichonema* and *Crocus* together with *Ixia* in the *Ixieae*; he transferred *Galaxia* to the *Gladioleae*.

Baker (1877) in his system of the Iridaceae, divided the family into three series, and the first of these, the *Ixieae*, into four tribes. One of these tribes, the *Croceae*, with free stamens, comprised the genera *Crocus*, *Syringodea*, *Romulea*, *Ixia*, and several others. In a second tribe, the *Galaxieae* with fused filaments, were placed *Galaxia*, *Spatalanthus*, *Homeria*, etc.

Klatt (1882), in his additions to and comments on Baker's system, separated *Syringodea* and *Crocus* from *Romulea* into a distinct tribe of the suborder Ixieae: the tribe *Euixieae* comprised *Romulea*, *Ixia*, etc., tribe *Croceae* consisted of *Crocus* and *Syringodea* only, and the tribe *Galaxiae* (fused filaments) had *Galaxia*, *Spatalanthus*, *Homeria*, etc.

Bentham and Hooker (1883) were the first to separate *Romulea* from the *Ixieae*, and to group the four genera, *Romulea*, *Syringodea*, *Crocus* and *Galaxia*, together. They divided the Iridaceae into three tribes, the *Moraeeae*, *Sisyrinchieae*, and *Ixieae*, and placed the four genera in the *Croceae*, first subtribe of the *Sisyrinchieae*. This classification of *Romulea* and its allies was followed more or less by most later workers. For example, Pax (1888), after changing the status of Bentham and Hooker's subtribe *Croceae* to a subfamily *Crocoideae*, grouped the four above-mentioned genera together in this subfamily.

Baker in 1892 changed his classification of these genera to that of Bentham and Hooker. In the Flora Capensis (1896) he treated Bentham and Hooker's tribes as orders, and their subtribes as tribes, and also changed the name *Croceae* into *Galaxieae*, as *Crocus*, not being South African, did not come under consideration. This tribe contained only the genera *Galaxia*, *Syringodea* and *Romulea*, *Spatalanthus* being included with *Romulea*.

Diels (1930), in the second edition of Engler and Prantl's Pflanzen-familien, also followed Bentham and Hooker closely, only changing the name of the subtribe which contained the four genera into *Crocinae*. Hutchinson (1959) treated Bentham and Hooker's and Diel's subtribes as tribes, "each being fairly well circumscribed and more or less of equal status". The four genera were thus still grouped together.

In an important paper on the vegetative and floral morphology of the South African genera of the Iridaceae, Lewis (1954) drew up a phylogenetic diagram for the family. For this she took into consideration the various correlated morphological characters of the vegetative and floral organs. She gave evidence that *Galaxia* is morphologically distinct from *Romulea* and *Syringodea*, in its dorsiventral leaves, fused filaments, and style arms opposite the anthers, and that in these respects it stands nearer Homeria and allied genera, differing only in having undergone further reduction.

She showed further that certain morphological features of *Romulea* and *Syringodea* are similar to those found in some species of *Hesperantha* and *Geissorhiza* of the *Ixieae*, and suggested that the inflorescence of *Romulea*

and *Syringodea* had undergone very extensive reductions, from the typical spicate inflorescence of the *Ixieae*, to a solitary, terminal, sessile flower, subtended by a bract and a pair of united bracteoles.

She proposed to place *Galaxia* in the *Irideae*, and the genera *Romulea*, *Syringodea*, and *Crocus* with the *Ixieae*, in a distinct subtribe *Romulineae*. She stated that *Romulea* and *Crocus* had undoubtedly evolved from the same ancestral stock, *Crocus* having undergone further reductions in the internodes of the aerial stem, this being accompanied by an elongation of the perianth tube, as in *Syringodea*.

Goldblatt (1971) found further evidence in the chromosome morphology that *Galaxia* must be placed with the Irideae and *Romulea* and *Syringodea* with the *Ixieae*. Schulze (1971), studying the pollen morphology, came to similar conclusions.

Classification within the genus

Before 1860, so few species of *Romulea* were known that there was no need to subdivide the genus into sections. When describing the genus *Trichonema* in 1802, Ker listed only three species which he had transferred from *Ixia*. In his treatment of the order *Ensatae* (i.e. Iridaceae) in 1805, he listed six species, five of which were from the Cape, and in his Iridearum Genera of 1827, twelve species were listed with their synonyms. In the same year Ecklon listed 17 species of *Romulea* in a catalogue of the plants he had collected in South Africa. Seven of these, given with their dates of collection, localities and flower colours, were new, but were not described.

To my knowledge, the first attempt to classify the species of *Romulea* in infra-generic groups was by Klatt (1865–66). He divided the genus *Trichonema* into two sections: (i) section *Romulea*—stamina stigmatibus aequalia v. breviora—with 13 species, ten of which were from the Cape (one, *T. longitubum*, being a *Syringodea*); and (ii) section *Trichonema*—stigmatibus stamina superantibus—with eight species, of which two were from the Cape.

Baker, who had probably noticed that Klatt's subdivision of the genus on the relative lengths of the stamens and style was untenable, divided the genus in 1877 into two geographical groups: (i) species mediterraneae et montium Africae tropicalis, with 17 species; and (ii) species Capenses, with 19. The latter group was subdivided into *Lutea*, *Rubro-violaceae*, and *Chloroleucae*. He did not give any differentiating characters for his two geographical groups.

In 1882 Klatt divided the genus into two subgenera: (1) *Scaposes* (i.e. acaulescent but with scapes) with 38 species, of which 16 were from the Cape; and (2) *Trichonema* (caulescentes) with 16 species, eleven being from the Cape. This subdivision into caulescent and acaulescent species cannot be accepted without reservation. Although some species have stems incapable of elongating,

in others the stem length is influenced by light, remaining short in bright sunlight in the open and elongating in shaded localities.

Baker (1892) gave short descriptions, localities and types of 33 species, including 20 from the Cape. Like Pax (1888) he placed *Spatalanthus* with *Romulea*, and regarded *R. rosea* as an aggregate species, with five varieties, three of which had previously been described as distinct species. In this work he changed his geographical groups into: (i) species of Mediterranean origin, and (ii) species of the Cape and tropical Africa. In 1896 he divided the 20 Cape species into two subgenera: subgenus *Romulea Proper*, with free filaments, comprising 19 species which were again grouped according to flower colours; and subgenus *Spatalanthus* with connate filaments, with a single species, *R. monadelpha*.

Baker's use of flower colour as a differentiating feature resulted in an artificial classification in which closely related species and even colour variants, at that time considered to be distinct species, were separated into different sections. For example, *R. rosea* and *R. chloroleuca*, later found to be a colour variant of *R. rosea*, were placed in two sections, and the yellow *R. bulbocodioides* was separated from *R. latifolia*, a white variant. Furthermore, hybridisation experiments have shown that the separation of *R. monadelpha* in a distinct subgenus on account of its fused filaments is not tenable (de Vos 1970a, also this work under Experimental Hybridisation).

It is interesting to compare Klatt's treatment of the genus (1895) with that of Baker (1896). In Durand and Schinz's Conspectus Florae Africae Klatt (1895) listed 42 species of Romulea, with their synonyms, localities. and types. Thirty-two of these are South African, which is twelve more than Baker recognised in the Flora Capensis (1896). In a footnote to Klatt's paper (p. 143), Durand and Schinz stated that it appeared to them that Mr Baker reunited too many species and Mr Klatt not enough!

Almost like Baker, Béguinot (1907b–1909) divided the genus into two groups: (A) specie mediterranee o med.-atlantiche (27 species), and (B) specie Capensi e dell' Africa tropicale (40 species), also without giving any differentiating characters to the two groups. He subdivided each group into seven stirpes, the classification of the Cape and tropical African group being based largely on leaf anatomy and flower coloration. His classification is an improvement on those of earlier workers, but as he examined too few leaf specimens, he was not aware that in some species certain anatomical characters varied; and he also placed too great stress on flower colour. Several of his stirpes cannot be upheld, and some must be amended.

Diels (1930) changed Baker's two South African subgenera into sections. Section *Euromulea*, with free filaments, was subdivided into (i) Atlantic and Mediterranean species, and (ii) species of tropical and Southern Africa, as

Béguinot had done for the genus as a whole. Again no distinguishing morphological features were given for these geographical groups. The second section *Spatalanthus* comprised only *R. monadelpha*, with fused filaments.

Since the publication of the Flora Capensis dealing with the Iridaceae (1896), numerous new species of South African romuleas have been described in Europe by Schlechter and Béguinot, in Britain by N. E. Brown, W. Marais, and B. L. Burtt, and in South Africa by L. Bolus, G. J. Lewis, E. P. Phillips, and several by myself.

Some of the work done in England was based not only on herbarium material, but also on specimens cultivated in botanic gardens. The figures of Cape romuleas drawn from specimens cultivated in British gardens are often not typical, probably because of being grown with less light than in their natural environment. For example, the figure of *R. leipoldtii* in Curtis's Bot. Mag. tab.460 (1964) shows weaker stems than natural, and that of *R. monadelpha* (Sweet 1837) shows longer, ribbon-like perianth segments. Two species figured in the Bot. Mag., namely *Trichonema pudicum* and *T. speciosum*, could not be recognised at all and, as these figures are iconotypes, no specimens of the species having been preserved, the species had to be excluded as dubious (see under excluded species).

SYSTEMATIC TREATMENT

Introduction: proposed systematic treatment

For the revision of the South African species of Romulea herbarium specimens from the principal herbaria in Southern Africa, Europe, and Britain have been studied, as well as living material of almost all the South African species, collected from the veld and subsequently grown in the Stellenbosch botanic garden and at the department of Botany of the University of Stellenbosch.

In order to obtain a more natural classification of this notoriously difficult genus, the morphological features of the whole plant, including features of the corm, which were not studied before, and the leaf anatomy have been studied, as well as the chromosome numbers. Numerous hybridisation experiments were also carried out, to obtain additional data on possible relationships between species and varieties.

As the relationships between the Cape species and those of the northern hemisphere have not been studied yet, the romuleas of the northern hemisphere and of tropical Africa were examined in the herbaria of K, BM, and S, and were compared with the Cape species. The northern romuleas are much more uniform in morphology than those of the Cape, and form a more homogenous group. All have corms of the ciliata type and stand closest to the South African subsection *Ciliatae*, differing mainly in the possession of subepidermal fibre

bundles in the rib margins of the leaves, and possibly also in chromosome numbers (see under Chromosomes). I propose that the northern species be grouped in subsection *Romulea* (as this contains the type species of the genus), and that this subsection be placed in section *Romulea*, together with the four South African subsections *Ciliatae*, *Hirsutae*, *Aquaticae* and *Minutiflorae*.

In the course of the present investigation three unusual species have come to my notice which seem to stand between *Romulea* and *Syringodea*. They have vegetative features as in *Romulea*, namely typical four-grooved, unifacial, romulean leaves and corms similar to several of the types occurring in *Romulea*. But the perianth resembles that of *Syringodea* in being salver-shaped and in having a long narrow tube. The style branches, however, are deeply bifid as in *Romulea*, whereas the style branches in *Syringodea* are undivided and often clavate. These species are placed in a separate subgenus *Lomurea*, as they differ from *Romulea* only in the shape of the perianth. This is another example illustrating Lewis' observation (1954, p.90) that "in many of the larger genera (i.e. of the Iridaceae) there are almost invariably one or two species in which the flowers do not conform with the description given of the genus, although the vegetative characters are usually more or less typical".

Romulea

Maratti, Pl. Rom. Sat. 13 (1772), nom. cons.; (syn. prius *Ilmu* Adans. Fam. 2: 497 (1763): auct. Internat. Rules bot. Nomencl. Append. III no. 1261 (1905 et 1966).

Persoon 1805 p. 46 pro sect.; Sebastiani et Mauri 1818 p. 11; Planchon 1852–53 p. 33; Pfeiffer 1874 p. 985; Baker 1877 p. 86 et 1892 p. 97 et 1896 p. 36; Klatt 1882 p. 398; Bentham et Hooker 1883 p. 694; Pax 1888 p. 143; Baillon 1894 p. 156; Dalla Torre et Harms 1900–07 no. 1261; Béguinot 1908b p. 377; Marloth 1915 p. 147; Diels 1930 p. 474; Lewis 1950 p. 220; Phillips 1951 p. 212; Levyns 1966 p. 82.

Bulbocodium [Tourn. 1703 pro parte; Ludwig 1737 p. 12]: non Linnaeus 1737. Miller 1760 p. 160; Kuntze 1891 p. 700.

Crocus Linnaeus 1753 p. 36 pro parte et 1754 p. 23 pro parte et 1759 p. 862 pro parte.

Ixia Linnaeus 1762 p. 51 pro parte; Murray 1774 p. 75 pro parte; Willdenow 1797 p. 196 pro parte; Persoon 1805 p. 46 pro parte; Roemer et Schultes 1817 p. 373 pro parte.

Ilmu Adanson 1763 p. 497.

Trichonema Ker 1802 t. 575 et 1805 p. 222 et 1827 p. 79; Aiton 1810 p. 82; Sprengel 1830 p. 37; Reichenbach 1830–32 p. 83; Endlicher 1836–40 p. 169; Dietrich 1839 p. 126 et 159; Grisebach 1843 p. 372; Nees ab Esenbeck 1845 p. 168; Klatt 1865–66 p. 659; Harvey 1868 p. 376; Pfeiffe 1874 p. 1463.

Spatalanthus Sweet 1829 sub t. 300 et 1837 sub t. 300.

Corm campanulate with a circular basal disc, or obliquely flattened towards the base with a crescent-shaped basal ridge, or subglobose, or obovoid with a basal point; tunics hard, entire, smooth or in one instance fibrous, brown, split at the base into rows of minute fibrils or into straight or bent, stout, acuminate teeth, and at the apex into acuminate fibres. *Stem* short, hidden by sheathing leaf bases, or elongated, erect, slender, glabrous. *Basal sheaths* 1—3, sheathing the base of the shoot. *Leaves* few, all basal and rosette-like, or some basal and some cauline, distichous or spirodistichous, with bifacial sheaths and unifacial blades which are glabrous or rarely ciliate on the rib margins; *basal leaves* with blades filiform, terete or compressed cylindrical, 4-sulcate or rarely up to 8-sulcate or 4-winged, 0,5—5 mm diam., erect or curved or rarely spirally twisted; *cauline leaves* shorter than the basal leaves, with wider sheaths and shorter unifacial parts. *Inflorescence* a monochasial arrangement of one to several peduncles emerging successively, each with a single, terminal, sessile or subsessile flower within a persistent bivalved spathe. *Peduncles* semiterete or subterete, generally suberect, often becoming curved after flowering, usually glabrous. *Spathe valves* 2: *bract* green or subherbaceous, narrowly triangular or narrowly ovate, usually glabrous; *bracteole* generally subequal to the bract, with wide membranous margins or rarely wholly scarious. *Flowers* actinomorphic, thermonastic, generally funnel-shaped, rarely salver-shaped, variously coloured. *Perigone tube* short and generally funnel-shaped, or sometimes long, tubular in the lower part and dilated towards the top; *segments* usually equal or subequal, narrowly obovate or narrowly elliptical, rarely obovate or subrhomboid-cuneate or spatulate, acute to obtuse. *Stamens* usually inserted near the base of the perigone tube or sometimes where it widens, contiguous; *filaments* free or in one instance joined, erect, channelled on the inner side, usually minutely pilose towards the bases; *anthers* linear, sagittate, basifixed, erect or rarely patent or incurved; *pollen* usually yellow, rarely cream or brown or mauve. *Ovary* small, glabrous; *style* filiform, erect, with three deeply bifid branches, or rarely multifid; *stigmas* 6 or rarely more, generally elongated, narrowly ligulate, channelled above or conduplicate, with marginal papillae, patent or recurved. *Capsules* shortly cylindrical or sometimes globose or 3-lobed, loculicidally 3-valved, usually enclosed within the persistent spathe valves; *seeds* numerous, small, globose or angled, brown.

Type species *R. bulbocodium* (L.) Seb. et Maur. (*Crocus bulbocodium* L.), typ. cons.

Key to the Subgenera and Sections

1 Flowers campanulate or funnel-shaped, of various colours; perigone segments ascending, often becoming reflexed; perigone tube short, or rarely long (subsect. *Longitubae*, *R. kamisensis*) Subgenus *Romulea*

2 Basal foliage leaves usually widening in the upper half, 4-winged, X-shaped in transverse section, with two wide lateral grooves and a strong vein up the middle of each groove. 6. Section *Hirtae*

2 Basal foliage leaves not widening upwards, terete or compressed cylindrical, usually with 4 grooves and 4 ribs, rarely with 5—8 grooves and as many ribs or with the rib margins widened into 8 wings, or 2-grooved but then without a vein up the middle of each groove.

3 Corm campanulate with a circular basal ridge around a basal disc, or obliquely flattened towards the base with a crescent-shaped or fan-shaped basal ridge which is about as wide as the corm or wider, or slightly narrower; tunics at the base of the corm usually split into fine parallel fibrils or small fibril clusters.

4 Basal ridge of the corm generally fan-shaped, wider than the corm, often almost vertical across the corm base; flowers yellow, sometimes with long perigone tube; leaves several, rarely only one, for the larger part bifacial, conduplicate, with only the upper 15—60 mm or sometimes the upper quarter unifacial, often spirally twisted or flexuose, or sometimes curved or suberect; bract and bracteole membranous, or submembranous in the lower half and greenish or sometimes green in the upper and the bracteole then with wide membranous margins . . . 2. Section *Tortuosae*

4 Basal ridge of the corm circular or crescent-shaped, usually horizontal or oblique, as wide as the corm or slightly narrower, or sometimes wider but the bract then green (*Hirsutae*, *R. montana*, *R. toximontana*); flowers of various colours, rarely with a long perigone tube but the flowers then pink; leaves several; basal foliage leaves unifacial in the upper half to three-quarters, terete or compressed cylindrical, rarely 3-angled or 3-winged, straight or curved; bract green; bracteole generally green with wide membranous margins or rarely wholly scarious.

5 Corm tunics on the basal ridge generally split into a fringe(s) of very slender or minute, parallel fibrils, or sometimes split irregularly, or rarely into a row of slender, parallel, very sharply bent fibrils which later break off on the ridge. 1. Section *Romulea*

5 Corm tunics on the basal ridge split into a row(s) of small, rounded or elongated, clusters of minute fibrils, with a root extending from the centre of some of the clusters.

6 Flowers 12—20 mm or rarely up to 24 mm long, pale pink or pale lilac-pink to almost white; stem abbreviated, hidden by sheathing leaf bases; leaves with a subepidermal fibre strand in each rib margin (transverse section) and with high epidermal papillae in the grooves 4. Section *Pratenses*

6 Flowers 25—40 mm long, variously coloured, or rarely smaller and then yellow or apricot-coloured; stem long, extending above-ground, or short and hidden by leaf bases; leaves without subepidermal fibres in the rib margins (transverse section) and generally without papillae or with rudimentary papillae in the grooves. 3. Section *Aggregatae*

3 Corm rounded or pointed at the base or rarely with a very small, almost pointed, basal ridge which is much narrower than the diameter of the corm; tunics at the base of the corm usually split into coarse, bent or straight, acuminate teeth.

7 Bracteole without stronger veins and not distinctly 2-keeled; bract without a stronger median vein 5. Section *Roseae*

7 Bracteole 2-keeled, usually with 2 stronger veins especially in the upper half; bract often with a stronger median vein in the upper half 7. Section *Bicarinatae*

1 Flowers salver-shaped, not yellow; perigone segments spreading at right angles from a long, narrow perigone tube Subgenus *Lonurea*

8 Corm rounded or pointed at the base, with long, bent or almost straight, acuminate teeth; foliage leaves several, usually more than 1 mm in diam.; style more than 20 mm long. 8. Section *Lonurea*

8 Corm with a crescent-shaped basal ridge; foliage leaf one or sometimes two, less than 1 mm in diam.; style 15—20 mm long 9. Section *Stellanthe*

1 KEY TO THE SECTION ROMULEA

1 Corm symmetrical, campanulate, with a circular basal ridge around a flat or slightly concave basal disc (1.2 Subsection *Hirsutae*)
2 Leaves spirally twisted 24. *Romulea tortilis*
2 Leaves straight or bent but not spirally twisted.
3 Flowers magenta, pink, apricot or yellow inside, often with a yellow cup and dark blotches in the throat.
4 Perigone generally bright yellow, sometimes pale, rarely with brown blotches in the throat 22. *Romulea triflora*
4 Perigone magenta, pink or apricot, often with dark blotches in the throat.
5 Segments of perigone generally more than 6 mm wide, rarely less and then apricot-coloured; flowers deep rosy-pink, magenta, or apricot inside, usually with dark blotches in the throat 23. *Romulea hirsuta*
5 Segments of perigone less than 5 mm wide, rarely up to 6 mm; flowers pale pink inside without dark blotches; outer segments often deeper pink or reddish on the backs 25. *Romulea gracilliua*
3 Flowers white or cream inside, with a yellow cup, without dark blotches in the throat.
6 Outer perigone segments greenish or cream on their backs; basal ridge of the corm not much wider than the corm itself, with tunics usually split into regularly arranged parallel fibrils; peduncles of fruiting specimens suberect or slightly patent. 22. *Romulea triflora*
6 Outer perigone segments usually purplish or reddish on their backs, or sometimes greenish; basal ridge of the corm much wider than the corm, with the tunics irregularly lacerated or split into irregular fibril groups on the ridge; peduncles of fruiting specimens very widely patent 26. *Romulea sladenii*
1 Corm asymmetrical, obliquely flattened towards the base, with a crescent-shaped basal ridge.
7 Upper unifacial part of the basal foliage leaves 5—8-grooved and 5—8-ribbed; inner perigone segments spatulate, sometimes apiculate, differing in shape from the outer segments; plants aquatic in seasonal pools, with the corms and bases of the stems and leaves submerged (1.3 Subsection *Aquaticae*)
8 Basal foliage leaf one; perigone white or cream in the upper half, yellow in the cup; style less than 10 mm long 28. *Romulea aquatica*
8 Basal foliage leaves 2; perigone yellow; style more than 10 mm long. 27. *Romulea multisulcata*
7 Upper unifacial part of the basal foliage leaves 4-grooved and 4-ribbed, or rarely with two wide grooves and one wide and one narrow rib or 3-angled; inner and outer perigone segments more or less similar, generally narrowly obovate to elliptical; plants terrestrial or sometimes in marshy localities.
9 Full-grown corm vertically elongated, higher than wide, with a somewhat flattened or sometimes slightly wavy basal ridge; flowers usually up to 16 mm long or rarely up to 20 mm; bracteole usually with rather large brown spots on the membranous margins. (1.4 Subsection *Minutiflorae*)
10 Flowers usually less than 15 mm long, pale mauve or rarely almost white; perigone segments less than 3 mm wide; brown spots on the bracteole well defined. 29. *Romulea minutiflora*
10 Flowers 15—20 mm long, cream or white; perigone segments 3—4 mm wide; brown spots on the membranous margins of the bracteole absent or faint. 30. *Romulea sinispinosensis*
9 Full-grown corm more or less isodiametric, with a crescent-shaped basal ridge; flowers usually more than 16 mm long; bracteole with white, brownish, brown-edged or minutely brown-streaked membranous margins, or sometimes wholly membranous. (1.1 Subsection *Ciliatae*)
11 Anther connectives attenuate, produced for 2,5—6 mm above the thecae of the anthers 3. *Romulea flexuosa*
11 Anther connectives not as above, not or hardly produced above the thecae.
12 Bract green, with brown-streaked or brownish membranous margins which often widen upwards to a wide membranous tip.
13 Flowers yellow; bract without a stronger median vein. 19. *Romulea pearsonii*
13 Flowers bright magenta; bract often with a stronger median vein. 20. *Romulea oliveri*

12 Bract green; membranous margins of bract, if present, very narrow, colourless.
14 Perigone segments in the upper *half* to third lavender-blue, cream or white or rarely bluish-violet, and different from the lower part which is yellow or orange-yellow, without blotches in the throat; bracteole submembranous, not bright green in the centre.
15 Upper part of segments cream or white, 5—8 mm wide; outer segments not blotched on the backs; usually two basal foliage leaves present when the stem is elongated 14. *Romulea leipoldtii*
15 Upper part of segments often lavender-blue with a pale transverse band across the middle when fresh, or rarely bluish-violet or white, up to 5 mm wide; outer segments often irregularly blotched on the backs; one or two basal foliage leaves present when the stem is elongated.
13. *Romulea tabularis*
14 Perigone concolorous inside, or only the cup and sometimes the bases of the segments differently coloured, often with blotches in the throat; bracteole bright green in the centre or sometimes membranous or submembranous.
16 Flowers yellow inside.
17 Filaments at least twice as long as the anthers; each leaf rib with a single vein (transverse section) 10. *Romulea sulphurea*
17 Filaments not or only slightly longer than the anthers; each lateral leaf rib with a large vein and two, or rarely more, small veins.
18 Bracteole in the centre and up to the tip as green as the bract, with wide, white or brownish membranous margins.
19 Membranous margins of bracteole usually brownish, brown-edged or minutely brown-streaked, especially in the upper half; perigone segments often with dark blotches in the throat, narrowly obovate, usually acute or sometimes subobtuse; basal ridge of the corm often wider than the corm, often with irregularly arranged basal fibrils . . . 11. *Romulea montana*
19 Membranous margins of bracteole white or colourless; perigone segments without dark blotches, the outer segments narrowly elliptical, generally obtuse; basal ridge of the corm not wider than the corm, with minute parallel basal fibrils.
9. *Romulea elliptica*
18 Bracteole wholly scarious or submembranous, or if greenish in the centre, not as green as the bract, with wide, brownish, brown-edged or brown-streaked membranous margins.
20 Plant with two basal foliage leaves when the stem is elongated; bracteole submembranous in the central zone, with wide, scarious margins; leaves with a small fibre strand in each rib margin (transverse section) 18. *Romulea citrina*
20 Plant with a single basal foliage leaf when the stem is elongated; bracteole wholly scarious or rarely submembranous in the central zone, with wide scarious margins; leaves without fibre strands in the rib margins (transverse section).
21 Flowers bright or pale yellow; bracteole usually scarious.
15. *Romulea flava*
21 Flowers bright orange; bracteole often greenish in the upper half or with reddish veins . . 17. *Romulea saldanhensis*
16 Flowers not yellow except for a frequently yellow cup.
22 Perigone tube more than 16 mm long, longer than the segments.
8. *Romulea kamisensis*
22 Perigone tube short, rarely up to 12 mm long, shorter than the segments.
23 Bracteole scarious or with a submembranous median zone; one or sometimes two basal foliage present if the stem is elongated.
24 Flowers white, with large black blotches usually bordered by a yellow margin in the throat; leaves 2-grooved, with one wide and one narrow rib, or appearing 3-angled.
16. *Romulea barkerae*

24 Flowers white or blue without blotches in the throat; leaves 4-grooved and 4-ribbed.

25 Perigone white, rarely blue, with a small yellow cup; one basal foliage leaf present when the stem is elongated; bracteole usually wholly scarious. 15. *Romulea flava*

25 Perigone blue in the upper half, rarely white, with a large yellow cup and often a pale transverse band above the cup; one or two basal foliage leaves present when the stem is elongated; bracteole submembranous and reddish or greenish in the central zone. 13. *Romulea tabularis*

23 Bracteole with a green median zone and wide membranous margins; two basal foliage leaves present if the stem is elongated.

26 Filaments partly or wholly red or reddish-black, or rarely yellow, inserted halfway up the perigone tube; flowers with very little or no yellow at the base. 7. *Romulea namaquensis*

26 Filaments orange-yellow to pale yellow, inserted near the base or in the lower half of the perigone tube; flowers usually with an orange or golden-yellow cup, or cup sometimes pale yellow and flowers then small, or sometimes with only a yellow or orange perigone tube.

27 Perigone segments white or cream inside or sometimes pale blue.

28 Membranous margins of the bracteole brown-edged; basal ridge of the corm often wider than the corm with fibrils irregularly grouped. 12. *Romulea toximontana*

28 Membranous margins of the bracteole white or colourless; basal ridge of the corm about as wide as the corm or narrower, with slender parallel fibrils.

29 Flowers 15—20 mm long or rarely up to 24 mm, white or cream, sometimes drying to pale blue; leaves with a subepidermal fibre strand in each rib margin (transverse section). 21. *Romulea gigantea*

29 Flowers longer than 25 mm, white, the outer segments sometimes coloured on the backs; leaves without fibre strands in the rib margins. 1. *Romulea schlechteri*

27 Perigone segments magenta or pink to pale violet, sometimes with dark blotches in the throat.

30 Bract keeled, much longer than the bracteole and sometimes almost as long as the flower; flowers pale lilac-pink 2. *Romulea papyracea*

30 Bract not keeled, subequal to the bracteole or slightly longer, much shorter than the flower; flowers magenta, bright pink or violet, sometimes with dark blotches in the throat.

31 Flowers deep old rose or bright pink, with large maroon or violet blotches in the throat. 6. *Romulea biflora*

31 Flowers magenta-pink or pale violet, without dark blotches in the throat.

32 Perigone segments generally obtuse; outer segments shiny and wine-coloured on the backs, without any markings, often becoming violet on drying 4. *Romulea vinacea*

32 Perigone segments acute to subobtuse; outer segments variously coloured and marked on the backs but not shiny or wine-coloured.
33 Stem generally less than 10 cm long, rigid; flowers lilac-pink or pale mauve; filaments pilose near their bases.
1. *Romulea schlechteri*
33 Stem often more than 10 cm long, rarely short, very slender; flowers magenta-pink with reddish veins in the throat; filaments minutely pilose almost to their tops.
5. *Romulea saxatilis*

2 KEY TO THE SECTION TORTUOSAE

1 Perigone tube less than 10 mm long, funnel-shaped and shorter than the segments.
(2.1 Subsection *Tortuosae*)
2 Foliage leaves several, spirally twisted, flexuose or sometimes bent, without adhering sand particles.
3 Corm with a wide, more or less vertical, fan-shaped, basal ridge which is much wider than the corm; bract and bracteole largely membranous or submembranous, greenish towards the tips only; leaves usually spirally twisted or flexuose.
32. *Romulea tortuosa*
3 Corm with a somewhat more horizontal or oblique, crescent-shaped, basal ridge, which is not much wider than the corm itself; bract and bracteole green, greenish or reddish, submembranous in the lower half, the bracteole with wide, brown-edged or brown-speckled, membranous margins; leaves bent or sometimes suberect.
31. *Romulea austinii*
2 Foliage leaf generally one (rarely two leaves present), suberect or bent, with adhering sand particles 33. *Romulea sphaerocarpa*
1 Perigone tube generally longer than 15 mm, narrowly tubular for most of its length, widening in the upper part, longer than or equal to, or rarely slightly shorter than the segments.
(2.2 Subsection *Longitubae*)
34. *Romulea macowanii*

3 KEY TO THE SECTION AGGREGATAE

1 Filaments shorter than the anthers; flowers bright carmine-red or deep rosy-pink, sometimes with dark blotches in the throat, cup not bright yellow; corm symmetrical, with a circular basal ridge, or slightly asymmetrical with a horse-shoe-shaped basal ridge.
(3.1 Subsection *Amoenae*)
2 Corm with a circular basal ridge; flowers carmine-red or deep rosy-pink, with large purplish-black blotches in the throat and the cup with slender dark lines.
42. *Romulea amoena*
2 Corm with a horse-shoe-shaped ridge at the base; flowers carmine, without dark blotches or a differently coloured cup 41. *Romulea sanguinalis*
1 Filaments subequal to the anthers or longer; flowers yellow, orange, apricot, magenta, pink or greenish, rarely with dark blotches in the throat and the cup then orange-yellow; corm asymmetrical, with a crescent-shaped or horse-shoe-shaped basal ridge.
(3.1 Subsection *Aggregatae*)
3 Anthers never join at their tips; membranous margins of bracteoles white; stem short or rarely elongated up to 12 cm and shortly extending from the leaf sheaths.
4 Flowers yellow or sometimes apricot-coloured, sometimes with dark blotches in the throat 35. *Romulea setifolia*
4 Flowers magenta-pink with dark veins in the throat . 36. *Romulea albomarginata*
3 Anthers joined at their tips in young flowers, later becoming free; membranous margins of bracteoles generally brown, brown-edged or brown-speckled in the upper half and white in the lower; stem usually elongated, extending from the leaf sheaths.
5 Corm tunics wholly fibrous or split into narrow segments, with a dense group of fibres up to 12 cm long around the base of the aerial stem . . . 38. *Romulea fibrosa*
5 Corm tunics smooth and hard, with acuminate teeth or fibres up to 1 cm long around the base of the aerial stem, and small clusters of minute fibrils on the basal ridge.

6 Flowers orange 39. *Romulea jugicola*
6 Flowers not orange except sometimes for an orange-yellow cup.
7 Plants generally with two basal foliage leaves when the stem is elongated, the first leaf longer than the second; leaf ribs about equal in width.
8 Flowers cream, pale or greenish-yellow or apricot, often with darker apricot veins; bracteole with white membranous margins which are usually brown-speckled or brown-edged towards the tip. . . . 37. *Romulea longipes*
8 Flowers magenta-pink; membranous margins of bracteole often largely rusty-brown 38. *Romulea fibrosa*
7 Plants generally with a single basal foliage leaf when the stem is elongated, in some young plants rarely with two leaves and the first then shorter than the second; lateral leaf ribs narrower than the median ribs . . . 40. *Romulea dichotoma*

4 Section PRATENSES

Only one species 43. *Romulea pratensis*

5 Key to the section ROSEAE

1 Corm more or less pointed at the base, the tunics split into almost straight teeth or fibres converging towards the basal point; flowers not yellow inside except sometimes for a yellow cup.
2 Bracteole with white or colourless membranous margins; corm with slender fibrils on a very small ridge at the narrow, almost pointed base . . (5.1 Subsection *Autumnales*)
3 Stamens and style generally not reaching halfway up the perigone; membranous margins of the bracteole much wider than in the bract 44. *Romulea autumnalis*
3 Stamens and style generally reaching more than halfway up the perigone; membranous margins of the bracteole almost as narrow as those of the bract. 45. *Romulea campanuloides*
2 Bracteole with brown, brown-speckled or brown-edged membranous margins; corm with coarse acuminate teeth converging to a basal point . . (5.5 Subsection *Cruciatae*)
4 Flowers 40 mm long or longer, sometimes only 35 mm, old rose with dark red blotches in the throat, the cup usually pale yellow or greenish-yellow; each leaf rib with a continuous subepidermal layer of sclerenchyma, and a lignified epidermis (transverse section) 59. *Romulea eximia*
4 Flowers 25—35 mm long, sometimes up to 40 mm, magenta to lilac-pink, usually with a bluish-purple or violet zone or blotches in the throat, the cup golden-yellow or orange-yellow; leaf ribs with separate fibre bundles and an unlignified epidermis (transverse section) 58. *Romulea cruciata*
1 Corm generally rounded at the base with the tunics split into acuminate teeth bent towards one side, or the corm rarely pointed at the base with almost straight tunic teeth and the flowers then yellow; flowers variously coloured.
5 Bract with membranous margins narrower than in the bracteole or sometimes hardly visible, its tip minutely or hardly membranous; anthers erect, free or rarely joined at the tips in young flowers; leaf rib margins without a vascular strand (transverse section).
6 Perigone segments old rose, terra-cotta, apricot, yellow or rarely white inside; peduncles of mature capsules, on drying out, usually bending from their bases and widely patent, except in *Romulea monticola* (perhaps also in *Romulea cedarbergensis*) which has suberect peduncles and yellow flowers (5.3 Subsection *Campestres*)
7 Leaves 1—2 or sometimes 3, ca 0,5 mm diam., with hardly visible veins; flower 1 or rarely 2, white or very pale pink; filaments longer than the anthers. 56. *Romulea cedarbergensis*
7 Leaves 3 or more, 0,5—2,5 mm diam., with a stout vein in each rib; flowers 2 or usually more, not white; filaments generally subequal to the anthers.
8 Peduncles suberect or curved in fruiting specimens, not bending from their bases and becoming patent on drying out; flowers bright golden-yellow; anthers in young flowers joined at their tips; leaves (transverse section) with two small veins against the large lateral veins 55. *Romulea monticola*
8 Peduncles bending from their bases and becoming widely patent when the mature capsules dry out; flowers deep old rose, terra-cotta or sometimes yellow; anthers never joined at their tips; leaves (transverse section) with the two small veins separated from the large lateral veins by chlorenchyma . 54. *Romulea obscura*

6 Perigone segments magenta to lilac-pink, rosy-pink or white inside, without any yellow except in the cup; peduncles of the mature capsules, on drying out, more or less straightening and becoming suberect. (5.4 Subsection *Roseae*)
57. *Romulea rosea*

5 Bract with membranous margins almost as wide as in the bracteole and with a large membranous tip; anthers incurved, or erect and then usually joined at their tips in young flowers; leaf rib margins often with a small vascular strand against the fibre bundles (transverse section) (5.2 Subsection *Atrandrae*)

9 Flowers yellow, with or without dark blotches in the throat; cup yellow.

10 Inner perigone segments ca 2—3 mm wider than the outer segments; stigmas overtopping the anthers 52. *Romulea diversiformis*

10 Inner perigone segments subequal to the outer segments; stigmas not overtopping the anthers.

11 Corm more or less pointed at the base, with tunics split into almost straight acuminate basal teeth converging to the basal point.
53. *Romulea membranacea*

11 Corm rounded at the base, with tunics split into curved acuminate basal teeth bent towards one side.

12 Flowers 25 mm or less in length, pale yellow, without dark blotches in the throat; bract and bracteole largely membranous or green in the centre of the upper half 51. *Romulea malaniae*

12 Flowers more than 25 mm in length, bright yellow, often with dark blotches in the throat; bract and bracteole firm, green, with brown-streaked membranous margins and tips. 46. *Romulea luteoflora*

9 Flowers pink, magenta, lilac, white or rarely pale blue, with or without dark blotches in the throat; cup variously coloured.

13 Style branches multifid; stigmas terminal, usually more than 12.
50. *Romulea multifida*

13 Style branches bifid; stigmas elongated, usually 6 (except in *Romulea komsbergensis* which has rarely 7—12 stigmas).

14 Perigone cup brown at its base when fresh; pollen brown or rust-coloured especially when fresh; anthers generally circinate or incurved, or rarely almost erect, not at first joined at the tips; bract and bracteole largely submembranous, greenish in the centre. 49. *Romulea komsbergensis*

14 Perigone cup golden-yellow or pale yellow, often with dark longitudinal stripes; pollen yellow; anthers erect or slightly incurved, at first joined at their tips; bract and bracteole with a firm green median zone and wide membranous margins.

15 Bract with a linear green median zone; flowers magenta, pink, lilac or white, with or without dark blotches in the throat . . 47. *Romulea atrandra*

15 Bract with a triangular green median zone; flowers pale wistaria-blue, with a violet and below that an almost black blotch in the middle of each segment.
48. *Romulea hallii*

6 KEY TO THE SECTION HIRTAE

1 Corm rounded at the base with the tunics split into long acuminate teeth bent towards one side; perigone pale yellow, often with a pale reddish-brown, or greenish-yellow transverse band below the middle of each segment 60. *Romulea hirta*

1 Corm obliquely flattened towards the base with a crescent-shaped basal ridge; tunics often split into minute parallel fibrils on the basal ridge; perigone segments violet-rose to lilac, rarely salmon-pink, with a violet blotch or transverse band on each segment in the throat.
61. *Romulea tetragona*

7 KEY TO THE SECTION BICARINATAE

1 Filaments free.

2 Flowers red or pink with dark blotches in the throat.

3 Leaves about 1 mm or less in diam., terete, with 4 narrow grooves.
64. *Romulea sabulosa*

3 Leaves 2—5 mm wide, 4-sided, 8-angled or 8-winged, with 4 wide grooves.

4 Flowers bright pink, with a purplish-black blotch on each segment in the throat, cup bright yellow with a dark longitudinal line extending from each blotch.
62. *Romulea subfistulosa*

4 Flowers pinkish-red, with a median brownish-black blotch bordered by a pale violet zone on each segment in the throat, and below that an elongated yellow blotch. 66. *Romulea* × *vanzijliae*
2 Flowers yellow with dark blotches in the throat. . . . 63. *Romulea viridibracteata*
1 Filaments joined 65. *Romulea monadelpha*

8 Key to the section LOMUREA

1 Perigone tube less than 25 mm long; style 22—30 mm long; corm rounded at the base, with bent, acuminate, basal teeth 67. *Romulea syringodeoflora*
1 Perigone tube more than 30 mm long; style 60—65 mm long; corm pointed at the base, with almost straight, acuminate, basal teeth 68. *Romulea hantamensis*

9 Section STELLANTHE

Only one species 69. *Romulea stellata*

Subgenus Romulea

Romulea subgen. *Romulea Proper* Baker 1896 p. 36 et subgen. *Spathalanthus* Baker 1896 p. 37. Sect. *Euromulea* (Bkr.) Diels 1930 p. 474 et sect. *Spatalanthus* (Sweet) Diels 1930 p. 475.

Corm campanulate with a circular basal disc, or obliquely flattened towards the base with a crescent-shaped or fan-shaped basal ridge, or subglobose or obovoid with a rounded or pointed base. *Stem* short or elongated. *Leaves* few or rarely one, all basal, or basal and cauline, filiform, terete or compressed-cylindrical, 4-grooved or rarely 2-grooved or 5—8-grooved or 4 or 8-winged. *Flowers* funnel-shaped, with ascending and often recurved perianth segments. *Perigone tube* usually short and funnel-shaped or sometimes elongated and longer than the segments; *segments* usually narrowly obovate or elliptical, variously coloured and marked. *Stamens* usually erect, rarely incurved or patent, usually inserted near the base of the perigone tube; *filaments* minutely pilose towards the bases. *Capsules* generally produced well above-ground.

Type species: *R. bulbocodium* (L.) Seb. & Maur.

Except for three South African species, this subgenus comprises all the species of *Romulea* including those of the northern hemisphere, as well as the species *R. monadelpha* which Baker placed in a separate subgenus *Spathalanthus*.

1 Section Romulea

Corm asymmetrical, obliquely flattened towards the base, or sometimes symmetrical, campanulate, flat at the base, with a crescent-shaped or sometimes circular basal ridge; tunics split at the base into a fringe of fine parallel fibrils. *Stem* long or short. *Peduncles* bent in early fruiting stage or remaining suberect, or rarely patent. *Bract* mainly green. *Bracteole* green with wide membranous margins, or rarely membranous. *Flowers* large to very small, variously coloured.













FIG. 7.
R. biflora. Natural size.

FIG. 8.
R. schlechteri. Natural size.

FIG. 9.
R. kamisensis. Natural size.

FIG. 10.
R. tabularis. Natural size.

FIG. 11.
R. citrina. Natural size.

FIG. 12.
R. pearsonii. Natural size.

Perigone tube generally short, funnel-shaped. *Stamens* erect, inserted near the base of the perigone tube.

Leaf anatomy. Basal leaves unifacial in the upper half or rarely upper quarter only, 4-grooved and 4-ribbed, rarely with more ribs and grooves (Aquaticae). Each rib with 1—3 or sometimes more vascular bundles, with usually rather small sclerenchymatic sheaths which are against the epidermis or separated from it by the parenchymatic sheath. Rib margins with or without subepidermal fibre bundles, glabrous or sometimes ciliolate. Epidermal cells on the ribs rather large and thin-walled, and in the grooves papillose or without papillae. Styloids scattered in the mesophyll or in the parenchymatic bundle sheaths or in both; short crystals absent.

This section consists of four South African subsections, as well as subsection *Romulea* in which probably all the species of the northern hemisphere, including the type species of the genus, can be placed. Béguinot divided the northern species into seven stirpes, which could possibly, if retained, be regarded as subsections. The northern species which I was able to examine, all have a corm similar to that of subsection Ciliatae. They differ from the latter in the possession of subepidermal fibre bundles in the rib margins of the leaves, and probably also in chromosome numbers (see under Chromosomes).

1.1 Subsection Ciliatae De Vos sect. nov.

Stirps *R. Subluteae* Béguinot 1909 p. 98 pro parte. Stirps *Hirsutae* Béguinot 1909 p. 87 pro parte. Stirps *Bulbocodioidis* Béguinot 1909 p. 107 pro parte.

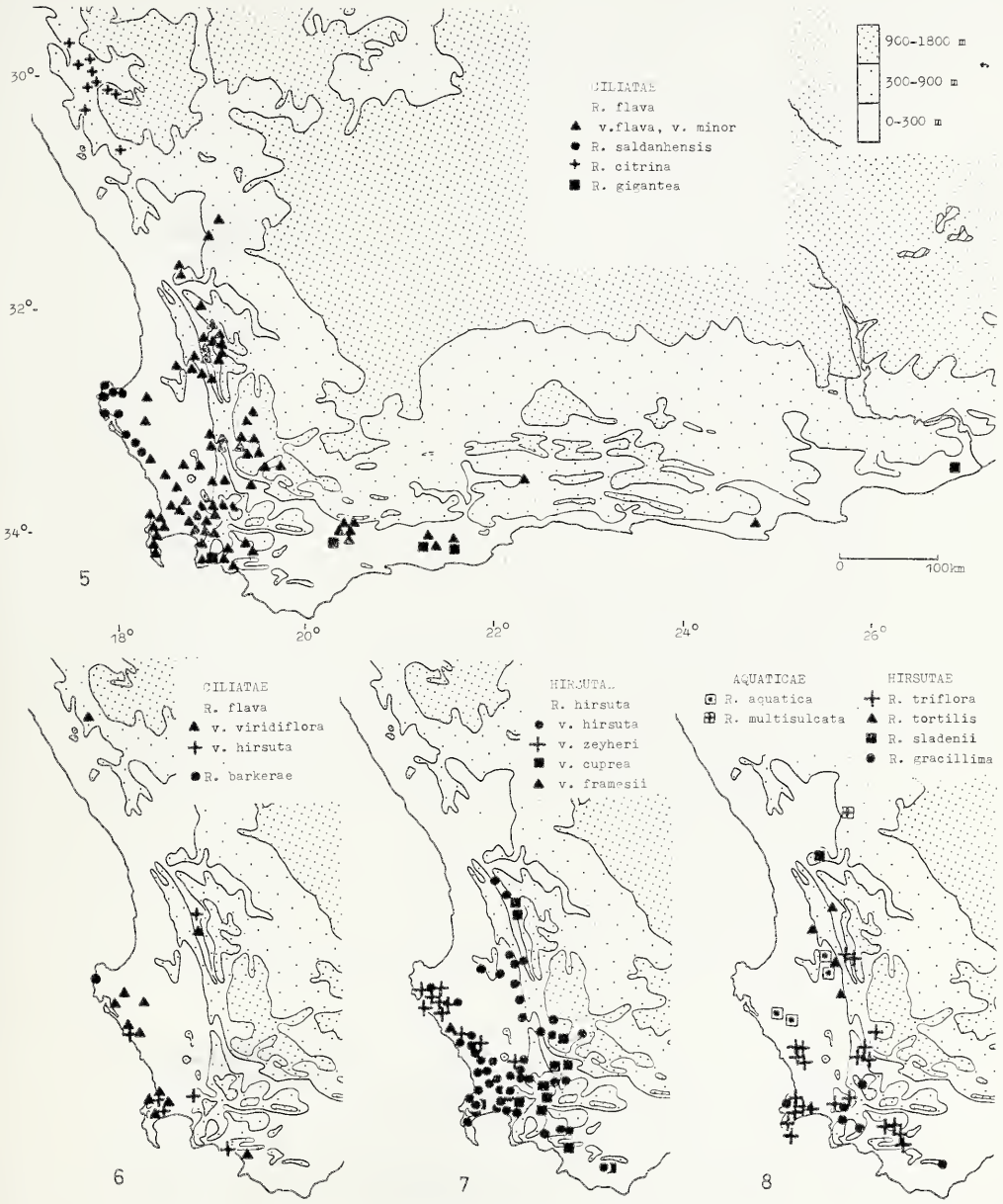
Cormus basi oblique complanatus, crista basilari lunata ciliata praeditus. *Caulis* plerumque elongatus. *Bractea* viridis. *Bracteola* marginibus latis membranaceis vel raro membranacea. *Flores* magni ad parvos varie colorati.

Type species: *R. flava* (Lam.) De Vos.

Corm obliquely flattened towards the base, with a crescent-shaped or horse-shoe-shaped basal ridge; tunics at the base split into a fringe of parallel fibrils. *Stem* elongated or sometimes short. *Leaves* 1—2 or rarely 3 basal and 1 or more cauline, or all seemingly basal in short-stemmed forms, terete to compressed cylindrical. *Peduncles* bent in early fruiting stage or remaining suberect. *Bract* green, mostly with very narrow membranous margins. *Bracteole* with wide membranous margins or rarely wholly membranous. *Flowers* large to small, variously coloured.

Leaf anatomy.—Upper unifacial half 4-grooved and 4-ribbed. Each rib with a large, and sometimes 2 or more small vascular bundles. Rib margins glabrous, rarely ciliolate, without fibres or rarely with small fibre bundles. Epidermal cells in the grooves without papillae or sometimes papillose.

Béguinot (1909) did not have a clear idea of this section as a group. He placed the species which were then known in three stirpes, each of which also



MAPS 5–8.

Geographical distribution: 5, 6, species of subsection *Ciliatae* (continued); 7, species of subsection *Hirsutae*; 8, subsections *Hirsutae* and *Aquaticae*.

included several greatly divergent species, such as *R. macowanii*, *R. sublutea* and *R. dichotoma*.

Not one of the three names of Béguinot's stirpes is available for this subsection. The stirps Hirsutae has been retained for species with campanulate corms; the type species of the stirps Subluteae has been transferred to the Hirsutae on account of its campanulate corm; and the type species of the stirps Bulbocodioidis is excluded as a dubious species (see under Excluded Species). A new name has therefore been chosen for this subsection.

Of all the South African romuleas this subsection shows the closest relationship with the species of the northern hemisphere, which also have the ciliata corm type. Of Béguinot's seven northern stirpes, the stirps Bulbocodium, in which he placed the type species of the genus, is of interest. The subsection Ciliatae differs from this stirps in the following features: the styles rarely overtop the anthers, the leaves are generally without subepidermal fibre bundles in the rib margins (with the exception of three species), in most species there are no epidermal papillae in the leaf grooves, and the bracteole is only rarely membranous.

Variation in length of stem occurs in several species of the Ciliatae. Plants growing in full sunlight have short stems, while in others, occurring among tall vegetation, the stems have elongated.

In this subsection have been included a few slightly aberrant species which show distinct relationships with other sections, e.g. *R. montana* and *R. toximontana* with the Tortuosae, and *R. pearsonii* with the Atrandrae. These groups probably evolved from the Ciliatae, and the above-mentioned species are, at least morphologically, intermediates. Three species, all from Namaqualand, with subepidermal fibre bundles in their leaf rib margins, resemble the northern hemisphere species in this feature. They should also be regarded as morphological intermediates.

1. **Romulea schlechteri** Béguinot, Bot. Jb. 38: 335 (1907a) et 1907b p. 111 et p. 474 et 1908a p. 160 et 1909 p. 93.

R. hybrida Béguinot pro hybr. 1907a p. 339 et 1907b p. 475 et 1909 p. 107—type *Zeyher 4043* (G holo; K, P). *R. elegans* Klatt var. *parviflora* Baker 1896 p. 42—syntypes: *Zeyher 4043* (K), *Zeyher 1602* partly (K).

Fig. 8, 13.

Plants 8—45 cm tall. *Corm* 7—12 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with fine parallel fibrils on the basal ridge, and apical fibres and teeth 5—30 mm long. *Stem* 2—30 cm long, extending from the leaf bases or hidden. *Basal sheaths* mostly 1—2, 10—35 mm long. *Basal leaves* 2 in long-stemmed forms, filiform, compressed cylindrical or subterete, 8—45 cm long, 0,5—1,5 mm diam.,

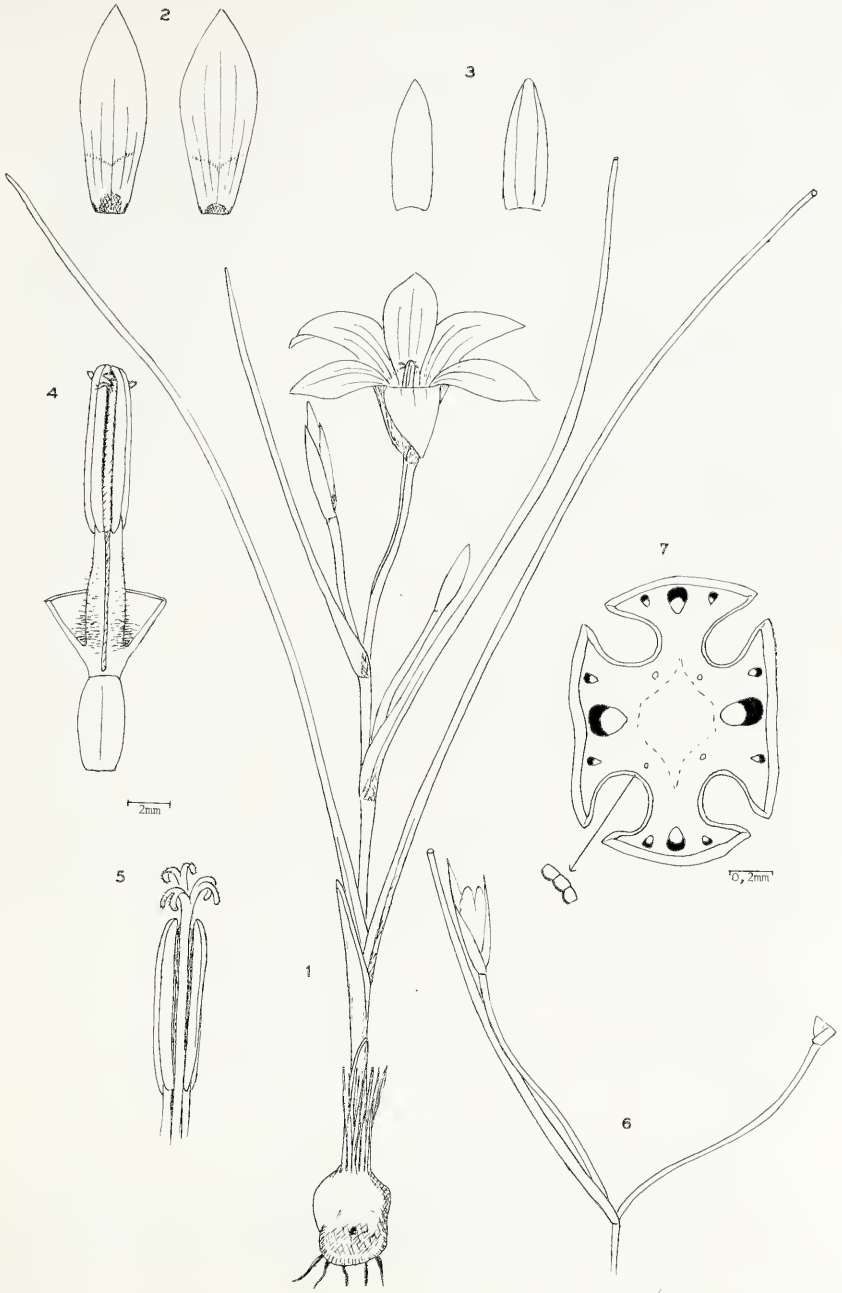


FIG. 13.

R. schlechteri (*de Vos* no. *2168*). 1, plant ×1. 2, outer and inner perianth segments, upper surface. 3, bract and bracteole, ×1. 4, pistil, stamens, and perianth tube. 5, stigmas of a long-styled form. 6, mature capsule ×1. 7, transverse section of leaf.

bent or suberect, grooves narrow, sometimes minutely ciliate on the rib margins, sheathing leaf bases ca. 3—4 mm wide; *cauline leaves* usually 1—2, sometimes more, shorter than the basal leaves. *Peduncles* 8—40 mm long, semiterete, suberect, minutely ciliate on the sharp angles or glabrous. *Bract green*, sometimes with very narrow membranous margins, narrowly ovate, 10—25 mm long, sometimes with minute hair stumps, subacute to obtuse. *Bracteole* sometimes slightly shorter than the bract, green, with wide, white membranous margins narrowing to a green tip. *Flowers* 1—3 or more, 20—50 mm long. *Perigone tube* 3—7 mm long, funnel-shaped; *segments* narrowly obovate or narrowly elliptical, 12—40 mm long, 4—14 mm wide, acute to subobtuse, pale violet or lilac-pink (RHS 76A) or cream, cup orange or golden-yellow, outer segments purplish or greenish or irregularly blotched or striped or sometimes with a pale median line on the backs. *Stamens* erect, inserted near the base of the perigone tube; *filaments* 4—10 mm long, pilose near their bases, orange; *anthers* 4—9 mm long, golden or pale yellow. *Style* 9—14 mm rarely to 20 mm long; *stigmas* ca. 4 mm long, below, at, or above the anther tips. *Capsules* ellipsoid, 8—10 mm long, on erect or suberect peduncles. *Chromosome number* 2n = 24 (*de Vos 2168, 1688*).

Lectotype. Béguinot (1907a) cited two collections, *Schlechter 8648* and *Bachmann 1576* partly, both in B. The former is undoubtedly what he had in mind when he described the species, as his description fits this better than the Bachmann specimens. *Schlechter 8648* in B is therefore chosen as lectotype. Isotypes in BOL, GRA, BM, G, K, Z, but not in PRE.

VREDENDAL. 7 mls. E by S of Doorn Bay: *Acocks 23984* (PRE). Along Doorn Bay road: *Boucher 113* (STE).

CLANWILLIAM. Between Leipoldtville and Graafwater: *Leipoldt 3827* (BOL, not in PRE or SAM), *Leipoldt 3828* (BOL). Warm Baths: *L. Bolus STE 18073*. Pakhuisberg: *Schlechter 8648* (all herb. but not in PRE), *Schlechter 8847* (PRE partly, not in other herbaria.) (In PRE the *Schlechter* nos. *8847* and *8648* were probably exchanged). Pakhuis Pass, north side: *Malan STE 30313* (STE). Near Modderfontein: *Gillett 3671* (BOL). Olifants River valley, 10 mls. S of Clanwilliam: *Lewis & Davis SAM 61071*.

PIKETBERG. Bergvallei: *Drège 8449* (G, P, S, not in K).

VREDENBURG. Saldanha Bay: *Zeyher* Aug., ex Hb. Gubb. (GRA).

HOPEFIELD. Near Hopefield: *Bachmann 1576* partly (B).

MALMESBURY. Flats S of Mamre: *Salter 3573* (BOL, BM, K), *de Vos 1278*. Between Darling and Ysterfontein: *de Vos 1688*. Darling: *Bayliss 1653* (PRE, Z).

CAPE. Mowbray: *Walters 3* (PRE).

WORCESTER. *Leipoldt 4446* (BOL). Du Toitskloof Pass: *Sidey 2114* (SAM, S).

CALEDON. Swartberg: *Zeyher 1602* partly (K), *Zeyher 4043*. Flats E of Viljoens Pass: *Davis SAM 61747*, *de Vos 2034*. Hottentots Holland Mts. near Somerset Sneeukop: *Stokoe SAM 61072*.

WITHOUT LOCALITY. *Sickmann* ann. 1827 (G).

Flowering season July to September.

On sandy flats and mountain ranges.

This somewhat variable species is readily distinguished by its corm of the ciliata type, two basal leaves when the stem is elongated, green bract, green

bracteole with wide, white, membranous margins which narrow to a green tip, and lilac-pink, pale violet, or cream flowers with a yellow cup.

Variation occurs in the size of the plants, in flower colouring, leaf width, number (1—3) of vascular bundles in each leaf rib, and also to some extent in the size of the epidermal cells of the leaves.

The species, as now circumscribed, consists of three ecological races. As these differ only in minor details, they have been included in a single species. Unfortunately not enough material was available for hybridisation experiments, and the constitution of the species is therefore based only on morphology, anatomy, and chromosome numbers.

On mountain ranges of the Clanwilliam district, at altitudes of ca. 900 m, a form occurs with lilac-pink or pale violet flowers, mostly curved leaves, and stems which usually remain short and more or less hidden by the leaf bases. Its leaves possess the largest epidermal cells to be found in the genus (up to 90 µm in height). The lectotype of *R. schlechteri* belongs to this form.

On sandy plains at low altitudes in the Vredendal, Clanwilliam, Piketberg, and Hopefield districts a second form occurs, with cream flowers, mostly suberect leaves and tall stems. To this belongs Béguinot's second citation (1907a).

In the mountains of Caledon and Worcester another form, consisting of rather small plants with cream or pinkish flowers, occurs. This was named *R. hybrida* by Béguinot. It differs further from the other forms in the possession of a single vascular bundle in each leaf rib, instead of three.

Zeyher's collection no. *4043* is the type of *R. hybrida*, which Béguinot described as a hybrid between *R. sublutea* (i.e. *R. triflora*) and *R. rosea*. The *Zeyher* specimens do not, however, show any marked affinity with either of these species, nor is there any indication of hybridity in specimens (*de Vos 2034*) found near the type locality and similar to the Zeyher specimens: these breed true and their pollen appears to be normal. Baker previously (1896) described the Zeyher specimens as *R. elegans* Klatt var. *parviflora*, possibly being misled by another collection in K, namely *Zeyher 1602*, which consists partly of *R. elegans* and partly of specimens similar to *Zeyher 4043*. In a note on the *Zeyher 4043* sheet in K, N. E. Brown later identified the collection with *R. papyracea*, to which it is undoubtedly allied. It differs from the latter, however, in its keelless bract which is not appreciably longer than the bracteole, and in the absence of papillae in the grooves of the leaves.

R. schlechteri is also allied to *R. vinacea*, from which it differs in its acute to subobtuse perianth segments, with the outer segments not shiny maroon on their backs, in its mostly glabrous leaves, usually golden or orange-yellow filaments, and flowers which open before noon.

2. **Romulea papyracea** W. Dod, J. Bot. 38: 170 (1900); Béguinot 1907b p. 111 et 1909 p. 94; Lewis 1950 p. 223.

Plant 15—30 cm tall. *Corm* 10—15 mm diam., obliquely flattened towards the base, with crescent-shaped basal ridge with minute parallel fibrils; outer tunics not seen, inner thin, papery, pale in colour. *Stem* very short or up to 40 mm long, mostly hidden by the leaf bases. *Basal sheath* mostly 1, up to 60 mm long. *Leaves* several, all basal or basal and cauline, 15—30 cm long, 1—2 mm diam., compressed cylindrical, recurved, with wide lateral ribs, grooves rather wide, sheathing leaf bases up to 5 mm wide. *Peduncles* 25—40 mm long, rather stout, semiterete, straight or somewhat bent. *Bract* green, with very narrow, hardly visible, membranous margins, 20—25 mm long, almost as long as the young flower, keeled, with prominent, closely spaced veins, acuminate. *Bracteole* shorter than the bract, with wider, white, membranous margins, subobtuse. *Flowers* 2—4, ca. 25 mm long. *Perigone tube* 4—5 mm long, funnel-shaped; *segments* ca. 16 mm long, ca. 5 mm wide, pale lilac-pink, cup yellow, outer segments darker pink on the backs. *Stamens* erect, inserted near the base of the perigone tube; *filaments* shorter than the anthers; *anthers* ca. 5 mm long. *Style* less than 10 mm long; *stigmas* not reaching the anther tips. *Capsule* not seen.

Holotype: *Dod 3075* in BOL. This sheet has a descriptive note in Dod's handwriting on it, and is therefore regarded as holotype. Isotypes in BM and K.

CAPE. Table Mountain on lower plateau: *Dod 3075*.

Flowering period October.

This species has never been found again since its discovery in 1897, notwithstanding an intensive survey of the Cape Peninsula in 1950. The name of the species was derived from the thin papery tunics of the corm. These are undoubtedly the inner tunical layers, the outer ones having been lost. The type of corm can, however, be determined in the Kew herbarium, where a specimen shows an indication of a crescent-shaped basal ridge with parallel fibrils on it.

The species is closely allied to *R. schlechteri*, from which it is distinguished by its long, keeled, and prominently veined bract, which is much longer than the bracteole and is in some specimens almost as long as the young flowers, and by the possession of rather wide, flat papillae in the stomatiferous grooves of the leaves.

3. **Romulea flexuosa** Klatt, Abh. naturf. Ges. Halle 15: 400 (1882); Baker 1892 p. 104 et 1896 p. 42, pro syn.: Béguinot 1909 p. 117 pro sp. dubia.

R. attenuata De Vos 1955 p. 101—type *Leipoldt 4247* (BOL holo; PRE).

Icones: Jl S. Afr. Bot. 21: 102 (1955); this work Fig. 14.

Plants 15—40 cm tall. *Corm* 8—20 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; *tunics* hard, smooth, brown, with

minute parallel fibrils on the basal ridge, and sharp apical teeth 5—10 mm long. *Stem* 2—25 cm long, usually extending above-ground, suberect or slightly flexuose, sometimes branched. *Basal sheaths* 2, 15—70 mm long. *Basal leaves* 2, filiform, 15—40 cm long, 0,5—1 mm diam., suberect or bent, grooves very narrow, sheathing leaf bases 2—3 mm wide; *cauline leaves* 1—3, shorter than the basal leaves. *Peduncles* 10—60 mm long, semiterete, erect or bent. *Bract* green with very narrow membranous margins, almost narrowly triangular, 15—30 mm long, acute, reaching to the middle of the perigone or higher. *Bracteole* sometimes slightly shorter than the bract, with wide colourless membranous margins narrowing to a green tip, acute to subobtuse. *Flowers* usually 1—3, 30—45 mm long. *Perigone tube* 5—8 mm long, funnel-shaped; *segments* 25—35 mm long, 7—11 mm wide, acute to subobtuse, white, cup brownish or off-white, outer segments narrowly elliptical, with irregular pink or purplish-brown and green markings on the backs, inner segments narrowly obovate, sometimes apiculate. *Stamens* erect, inserted below the middle of the perigone tube, reaching halfway or higher up the perigone; *filaments* 6—7 mm long, pilose at the base; *anthers* widely sagittate, 12—15 mm long, white, with attenuate connectives elongated for 2, 5—6 mm above the thecae. *Style* 12—16 mm long; *stigmas* 2—3 mm long, reaching halfway up the anthers or lower, white. *Capsules* ellipsoidal, up to 10 mm long, on arcuate peduncles. *Chromosome number* 2n = ca 24 (*Oliver STE 30273*).

Holotype. Specimens nos. 1 and 4 of a collection in S labelled *4038*, and *Romulea flexuosa* F. W. Klatt, the latter in Klatt's handwriting, are probably all that is left of Klatt's type, *Drège 4038* (private communication from Dr. B. Nordenstam, Curator of S).

?NAMAQUALAND. *Drège 2636* partly (S, not in B, G, K or P).
CALVINIA. Lokenburg and fynbos of T.M.S. ridges, in crevices: *Acocks 18224* (PRE).
VANRHYNSDORP. Summit of Gifberg: *Salter 7291* (BOL).
CLANWILLIAM. Elandsfontein: *Leipoldt 4247* (BOL, PRE). Between Leipoldtville and Graafwater: *Leipoldt 3827* partly (PRE, SAM, not in BOL). Hill opposite lower dam Olifants River: *Oliver STE 30273*.
PIKETBERG. On Piketberg: *Stokoe 4576, 4576a* (BOL).
SOMERSET WEST. Hottentotsholland: *Wall* Oct. 1937 (S).
WITHOUT LOCALITY. Ex hb. Klatt sub *R. arenaria* Eckl. partly (S). *Drège 4038*, nos. *1 & 4* (S).

Flowering period May to July.

This rare, early flowering species occurs amongst rocks and in crevices on mountain plateaux and ridges of the Western Cape. It is readily distinguished by its sagittate anthers with attenuated connectives, which are elongated for up to 6 mm above the thecae, and by its white flowers. It is allied to the low altitude form of *R. schlechteri*, differing from the latter mainly in its elongated connectives and therefore much longer anthers, which reach higher up the perianth, and in the sometimes flexuose upper part of the stem. Klatt based his specific

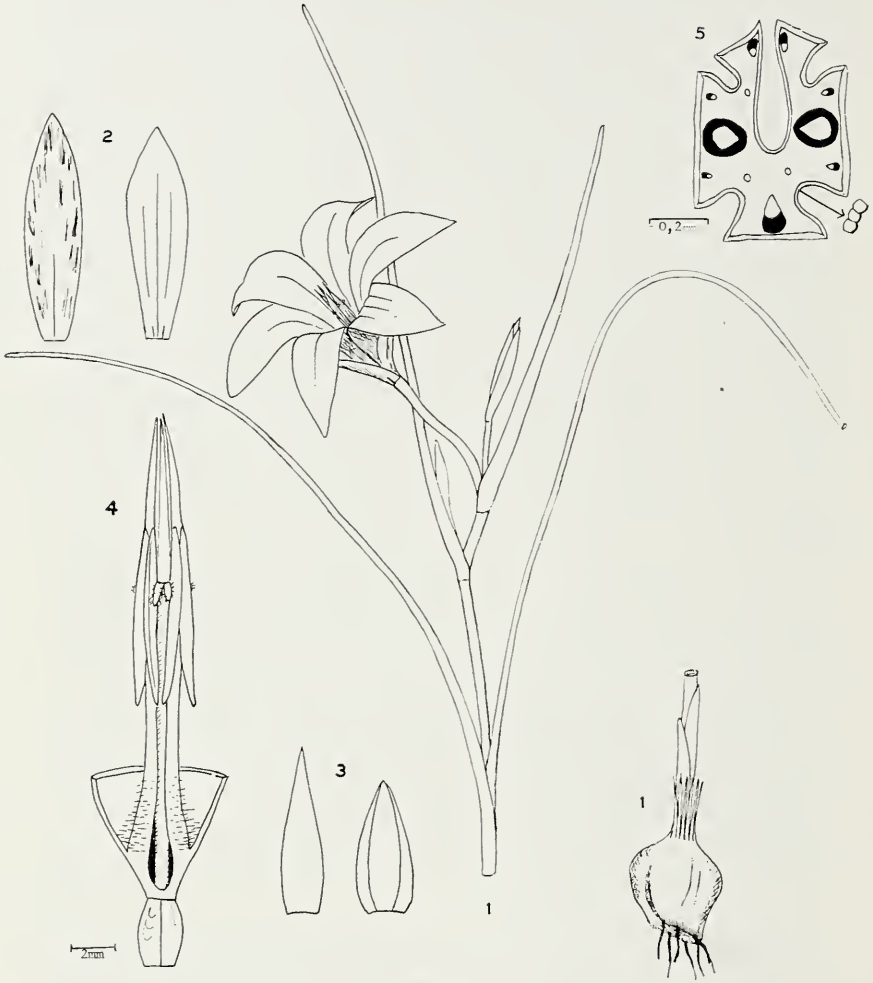


FIG. 14.

R. flexuosa (*Oliver, STE 30273*). 1, plant ×1. 2, outer and inner perianth segments, lower surface. 3, bract and bracteole ×1. 4, pistil, stamens, and perianth tube. 5, transverse section of leaf.

epithet for the species on this latter feature, which is, however, variable. He omitted to mention in his description the elongated connectives, a feature which is readily discernible in his type material in S. This omission led to an unfortunate renaming of the species in 1955.

4. **Romulea vinacea** De Vos sp. nov.
Fig. 15

Cormus 5—8 mm diam., basi oblique complanatus, crista lunata ciliata, tunicis rigidis laevibus brunneis, apice fibris 3—5 mm longis praedito. *Caulis* 20—70 mm longus erectus, supra terram breviter exsertus. *Vagina basilaris* plerumque 1. *Folia basilaria* 2, filiformia 6—24 cm longa, ad 1 mm diam., suberecta vel curvata, sulcis angustis, saepe marginibus porcarum minute ciliatis, basibus vaginantibus ca. 2 mm latis; *folia caulina* 1—2, breviora quam folia basilaria. *Pedunculi* 10—25 mm longi semiteretes erecti vel suberecti, aliquando minute ciliati in angulis acutis. *Bractea* viridis marginibus membranaceis perangustis aegre manifestis, anguste ovata 8—18 mm longa acuta vel emarginata. *Bracteola* viridis marginibus membranaceis latis incoloratis brunneo-marginatis in dimidio superiore, apice viridi subobtuso vel subacuto. *Flores* 1—2 interdum 3, 20—40 mm longi. *Tubus perigonii* 4—5 mm vel aliquando ad 8 mm longus infundibularis; *segmenta* anguste elliptica vel anguste obovata 14—28 mm longa 6—10 mm lata obtusa interdum minute emarginata vel subobtusa, lavendula, in fauce violaceo-nervata vel interdum violaceo-maculata, basi eburnea luteo-notata, segmenta exteriora a dorso nitentia vinacea. *Stamina* erecta, in dimidio inferiore tubi perigonii inserta, circa dimidium perigonii attingentia, eburnea; *filamenta* 6—9 mm longa fere ad apices pilosa; *antherae* 4—6 mm longae. *Stylus* 10—14 mm longus; *stigmata* plus minusve apices antherarum attingentia. *Capsulae* subglobosae vel ellipsoideae 5—15 mm longae, in pedunculis suberectis.

Holotype: *Lewis 2010* (SAM *60230*) in SAM.

Plants 7—24 cm tall. *Corm* 5—8 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with fine parallel fibrils on basal ridge, and apical fibrils 3—5 mm long. *Stem* 20—70 mm long, erect, shortly extending above ground. *Basal sheath* mostly 1, up to 40 mm long. *Basal leaves* 2, filiform, 6—24 mm long, up to 1 mm diam., suberect or curved, grooves narrow, often with minute hairs on margins of ribs, sheathing leaf bases ca. 2 mm wide; *cauline leaves* 1—2, shorter than basal leaves. *Peduncles* 10—25 mm long, semiterete, erect or suberect, sometimes minutely ciliate on the sharp angles. *Bract* green with very narrow, hardly visible membranous margins, narrowly ovate, 8—18 mm long, acute or emarginate. *Bracteole* green with wide colourless membranous margins, brown-edged in the upper half, tip green, subobtuse to subacute. *Flowers* 1—2, sometimes 3,

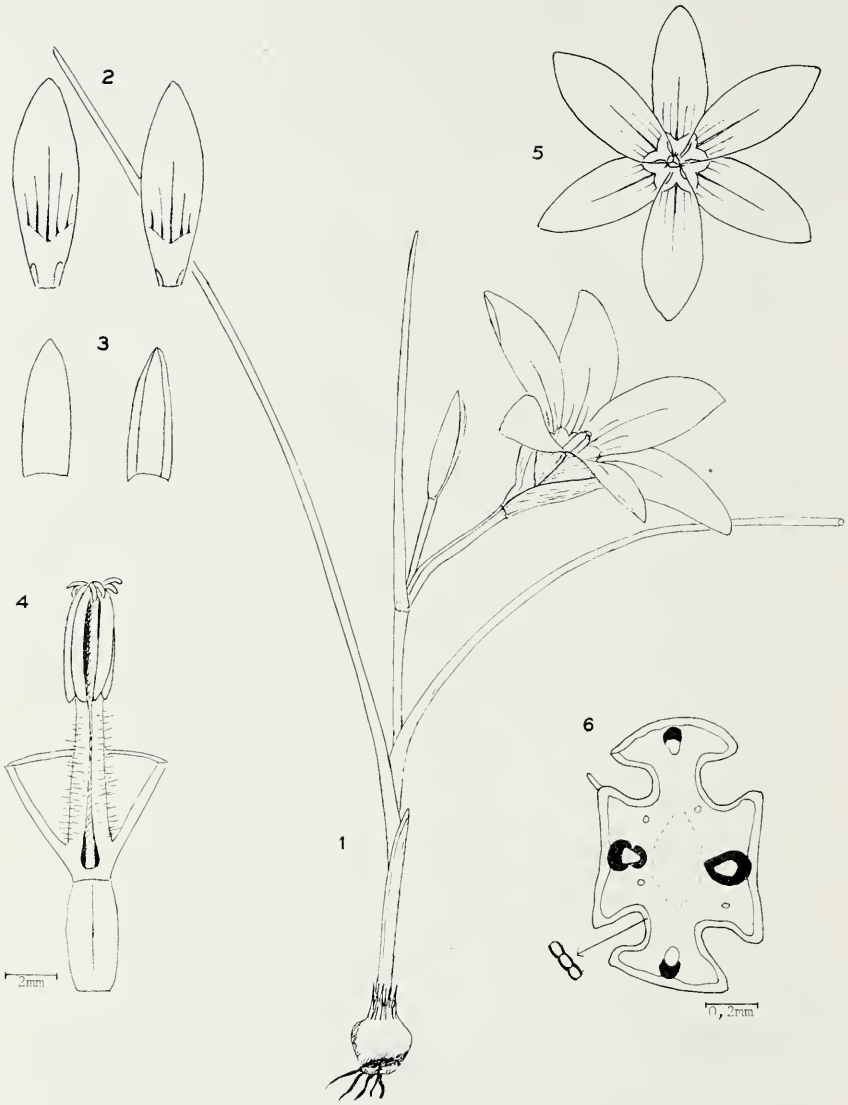


FIG. 15.

R. vinacea (*de Vos* no. *2108*). 1, plant ×1. 2, outer and inner perianth segments, upper surface. 3, bract and bracteole ×1. 4, pistil, stamens, and perianth tube. 5, flower. 6, transverse section of leaf.

20—40 mm long. *Perigone tube* 4—5 mm or sometimes to 8 mm long, funnel-shaped; *segments* narrowly elliptical or narrowly obovate, 14—28 mm long, 6—10 mm wide, obtuse, sometimes minutely emarginate or subobtuse, light bluish-violet (RHS 76B) with darker violet veins and sometimes violet blotches in throat, cup cream-coloured with yellow markings, outer segments shiny, wine-coloured on the backs. *Stamens* erect, inserted in lower half of perigone tube, cream-coloured; *filaments* 6—9 mm long, pilose almost to their tips; *anthers* 4—6 mm long. *Style* 10—14 mm long; *stigmas* more or less at the anther tips. *Capsules* subglobose to ellipsoid, 5—15 mm long, on suberect peduncles. *Chromosome number* 2n = 24 (*de Vos 1921*).

CLANWILLIAM. Pakhuis: *Leipoldt BOL 21278* (BOL), *Barker 6591* (NBG). Top of Pakhuis Pass: *Lewis 2010* (SAM), *de Vos 1921, 2108.*

Flowering period August.

In almost white sand, abundant on summit of Pakhuis Pass and around Leipoldt's grave. Seemingly with a very limited range.

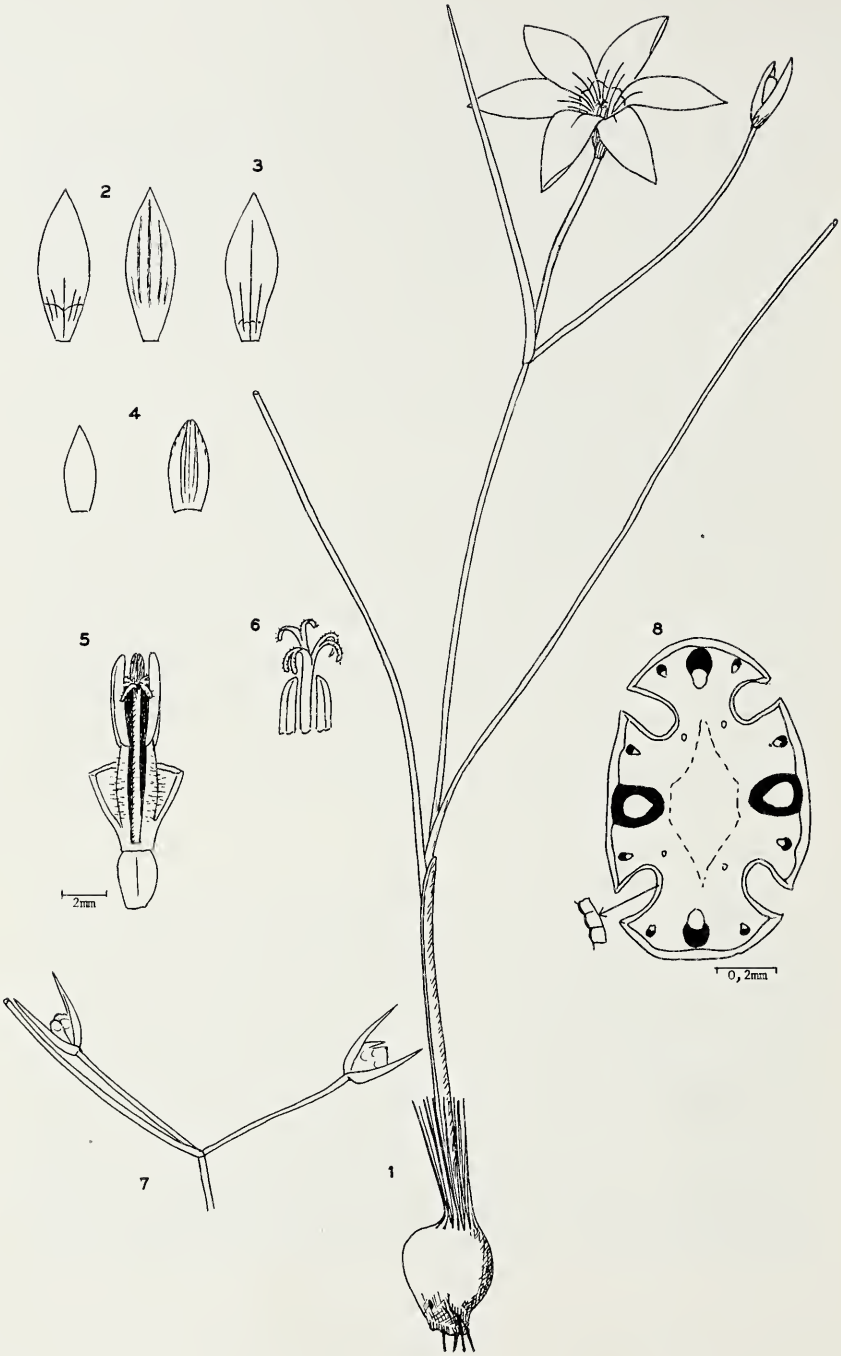
R. vinacea is readily distinguished by its pale blue-violet, almost lavender-coloured, flowers which open only in the afternoon around 3 p.m. and generally close after sundown; by its mostly obtuse perianth segments with violet lines in the throat, and by its outer segments which are shiny, and plum or wine-coloured on the backs. In dried specimens they become more reddish-purple. The stamens are white when fresh and the filaments are slightly longer than the anthers and pilose almost to their tips. The leaves are narrow and often minutely ciliate on the rib margins.

It stands nearest *R. schlechteri* and may be derived from it. It differs from the latter in the above-mentioned features.

5. **Romulea saxatilis** De Vos sp. nov.

Fig. 16.

Cormus 7—15 mm diam., basi oblique complanatus, crista lunata ciliata, tunicis rigidis laevibus brunneis, apice fibris 10—25 mm longis praedito. *Caulis* 10—25 cm vel interdum 2—30 cm longus, supra terram exsertus, pertenuis debilis, interdum subcurvatus vel suberectus. *Vagina basilaris* plerumque 1. *Folia basilaria* plerumque 2, filiformia 10—40 cm vel ad 60 cm longa, 0,5—0,8 mm diam., debilia curvata vel suberecta, sulcis perangustis, basibus vaginantibus 2—4 mm latis; *folia caulina* 1—2, breviora quam folia basilaria. *Pedunculi* 10—60 mm longi vel interdum ad 100 mm longi semiteretes suberecti vel curvati. *Bractea* viridis, marginibus membranaceis perangustis, plus minusve anguste triangularis, 8—15 mm longa obtusa vel acuta. *Bracteola* interdum parum brevior quam bractea, viridis, marginibus membranaceis latis albis vel interdum brunneo-punctatis, apice viridi. *Flores* plerumque 2, raro 1 vel 3, 15—30 mm longi. *Tubus perigonii* 4—6 mm longus infundibularis; *segmenta* anguste ellip-


2
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2mm
0,2mm
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1

tica, 9—22 mm longa 4—6 mm lata, obtusa vel acuta, magentea vel malvino-rosea, interdum maculis parvis atropurpureis in fauce, basi lutea, segmenta exteriora a dorso irregulariter roseo et flavo striata vel stria media pallida ornata vel atro-vittata. *Stamina* erecta, prope basin perigonii inserta, circa dimidium perigonii attingentia vel minora; *filamenta* 3—4 mm longa, minute pilosa fere ad apices, lutea, in medio dilatata; *antherae* 3—4 mm longae flavidae. *Stylus* 7—10 mm longus; *stigmata* apices antherarum attingentia vel antheras superantia. *Capsulae* globosae vel ellipsoideae 5—8 mm longae, in pedunculis rectis vel interdum subpatentibus e basibus.

Holotype: *Guthrie BOL 18558* in BOL.

Plants 10—40 cm or up to 60 cm tall. *Corm* 7—15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with fine parallel fibrils on the basal ridge, and apical fibres 10—25 mm long. *Stem* 10—25 cm or sometimes 2—30 cm long, extending above-ground, very slender, weak, sometimes somewhat bent or suberect. *Basal sheath* usually 1, 20—50 mm long. *Basal leaves* usually 2, filiform, 10—40 or up to 60 cm long, 0,5—0,8 mm diam., weak, bent or suberect, grooves very narrow, sheathing leaf bases 2—4 mm wide; *cauline leaves* 1—2, much shorter than the basal leaves. *Peduncles* 10—60 mm or sometimes up to 100 mm long, semiterete, suberect or bent. *Bract* green with very narrow membranous margins, more or less narrowly triangular, 8—15 mm long, obtuse to acute. *Bracteole* sometimes slightly shorter than the bract, green, with wide, white membranous margins which are sometimes brown-dotted and which narrow to a green tip. *Flowers* usually 2, rarely 1 or 3, 15—30 mm long. *Perigone tube* 4—6 mm long, funnel-shaped; *segments* narrowly elliptical, 9—22 mm long, 4—6 mm wide, obtuse or acute, magenta-pink (RHS 68A,B), sometimes with small dark blotches in the throat, cup golden-yellow, outer segments irregularly streaked with pink and yellow on the backs, or with a pale median line or dark longitudinal lines. *Stamens* erect, inserted near the base of the perigone tube; *filaments* 3—4 mm long, minutely pilose almost to their tops, widened in the middle, golden-yellow; *anthers* 3—4 mm long, pale yellow. *Style* 7—10 mm long; stigmas reaching the anther tips or overtopping them. *Capsules* globose or ellipsoid, 5—8 mm long, on straight peduncles which sometimes become slightly patent from their bases. *Chromosome number* 2n = ca 28 (*de Vos 2055*).

CLANWILLIAM. N Cedarberg, Koupoort: *Esterhuysen 12171* (BOL, K). Middelberg, Elandskloof: *Bond 640* (NBG), *Acocks 327* (S). Boskloof, Cedarberg: *Pocock 144* (STE).

PIKETBERG. Upper part of Kapiteinskloof, Banghoek: *Pillans 7715* (BOL). Plateau on Twenty Four Rivers mts. above Porterville: *Esterhuysen 16162* (BOL).

TULBAGH. Near Tulbagh Kloof: *Davis SAM 63694*.

CERES. Lower mountain slopes: *Guthrie BOL 18558*. Foot of mountain behind Ceres park: *Acocks 2237* (S). Top of Mitchell's Pass: *de Vos 2053*. Top of Gydouw Pass: *Lewis 2572* (SAM), *Maguire 1768* (NBG). Koue Bokkeveld: *de Vos 2055*.

FIG. 16.

R. saxatilis (*de Vos* no. *2053*). 1, plant ×1. 2, outer perianth segments, upper and lower surfaces. 3, inner segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, stigmas of a long-styled form. 7, mature capsules ×1. 8, transverse section of leaf.

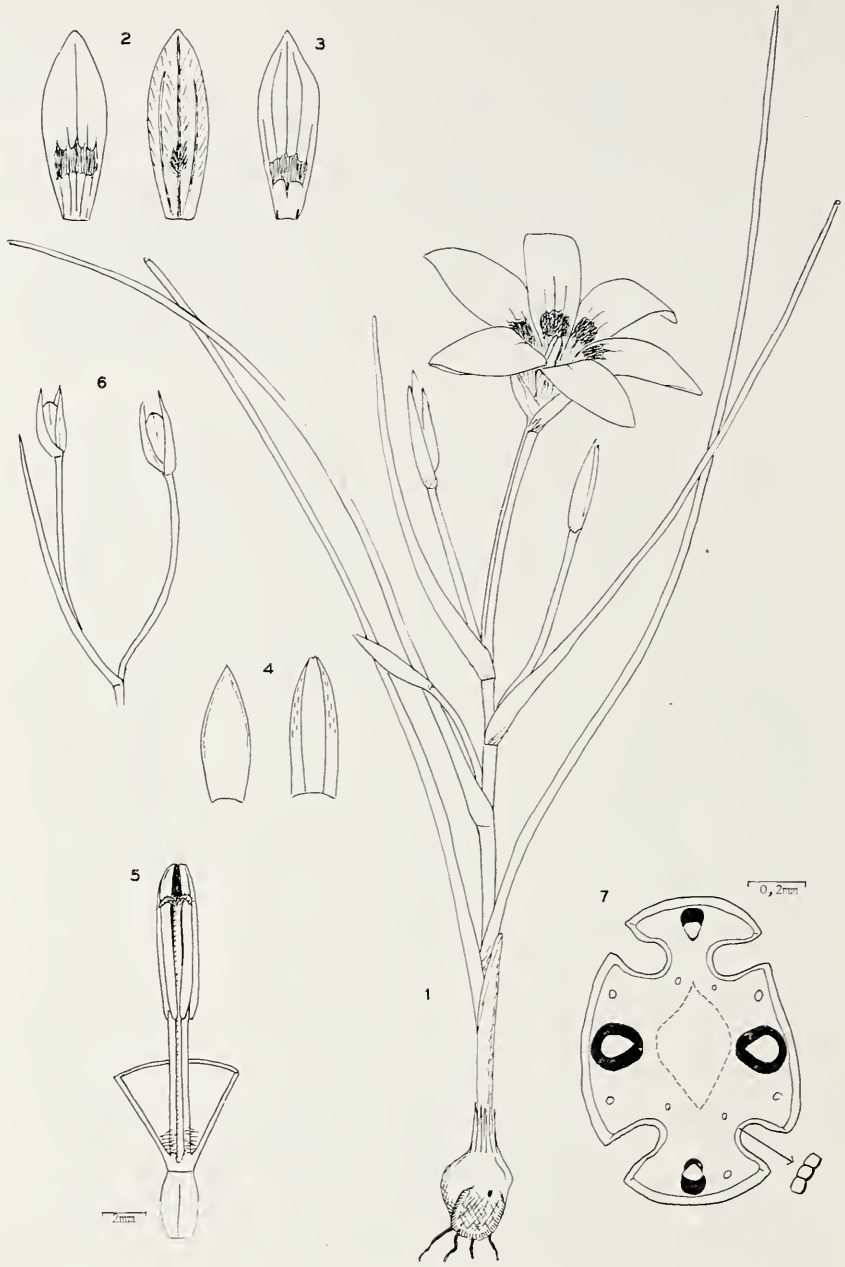


FIG. 17.

R. biflora (*de Vos* no. *1575*). 1, plant ×1. 2, outer perianth segments, upper and lower surfaces. 3, inner segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, ripening capsules ×1. 7, transverse section of leaf.

Flowering period September to October.

This species occurs mainly amongst rocks on mountain slopes and plateaux. It is closely allied to *R. schlechteri* and differs in its more slender habit, very slender, mostly elongated stem, its somewhat smaller flowers with filaments which are widened in their middle and minutely pilose almost to their tips. The leaf structure of the two species is almost identical, the only difference being that the epidermal cells of *R. saxatilis* are generally not as large as in *R. schlechteri*.

The flowers of *R. saxatilis* resemble those of *R. fibrosa* and *R. albomarginata*, and the species may have some affinity with these two species of the section Aggregatae—see also its divergent chromosome number. The basal fibrils of the corm and the leaf structure are, however, different.

6. **Romulea biflora** (Beg.) De Vos stat. nov.

R. ambigua Béguinot var. *biflora* Béguinot, Malpighia 23: 80 (1909)—type: *Schlechter 8694* (G holo; GRA, PRE, B, etc.).

Fig. 7, 17.

Plants 10—25 cm or 30 cm tall. *Corm* 5—10 mm diam., obliquely flattened towards the base, with a pronounced basal ridge forming an almost complete circle; tunics hard, smooth, brown, with fine parallel fibrils, sometimes slightly aggregated into small groups, on the basal ridge, and apical fibres 3—5 mm long. *Stem* 20—150 mm long, sometimes shortly extending above-ground, erect. *Basal sheath* 1, 10—50 mm long. *Basal leaves* 2, sometimes 3, filiform, 7—30 cm long, 0,5—1,5 mm diam., suberect or curved, grooves usually narrow, sheathing leaf bases 2—4 mm wide; *cauline leaves* 1—3, shorter than the basal leaves. *Peduncles* 15—50 mm long, semiterete, suberect or bent, elongating slightly after flowering. *Bract* green with very narrow, hardly visible membranous margins, narrowly ovate, somewhat concave, 12—25 mm long, obtuse to acute. *Bracteole* often somewhat shorter than the bract, green or greenish, with wide brown-streaked or sometimes colourless membranous margins, tip green, emarginate or subobtuse. *Flowers* 2—4, 25—45 mm long. *Perigone tube* 4—5 mm long, widely funnel-shaped; *segments* 18—35 mm long, 6—10 mm wide, subacute to obtuse or minutely apiculate, deep old rose or bright pink (RHS 54B, C, 31C), with purple or violet blotches in the throat, and small dark spots on each side at the bases, cup golden-yellow with dark veins; outer segments narrowly elliptical, red and greenish striped or mottled on the backs, inner segments narrowly obovate-elliptical, sometimes with bluish veins on the backs. *Stamens* erect, inserted in the lower half of the perigone tube; *filaments* 5—7 mm long, densely pilose at the bases and rarely minutely pilose in the lower half, orange-yellow; *anthers* 5—8 mm long, yellow or rarely violet. *Style* 11—13 mm long; *stigmas* pale or purple, reaching more or less to the anther tips or higher.

Capsule subglobose to ellipsoidal, up to 12 mm long, on suberect or bent peduncles. Chromosome number 2n = 24 (*de Vos 1575*).

Holotype: *Schlechter 8694* in G. Isotypes in GRA, PRE, B, BM, K, S.

VANRHYNSDORP. 7 mls. SSE of Vanrhynsdorp: *Acocks 19296* (PRE, K, M). 8 mls. SW of Vanrhynsdorp below spur of Gifberg: *Oliver STE 30283.*

CLANWILLIAM. Bidouwberg: *Schlechter 8694, Nortier STE 30194, de Vos 1575.* Road to Wupperthal: *Leipoldt BOL 20770* (BOL, SAM). Wupperthal: *Drège 8450b* (P). Pass into Bidouw valley: *Marsh 394* (STE).

WITHOUT LOCALITY. Hort. *Ross-Frames BOL 24773.*

Flowering period July to September.

On red clayey ground chiefly on the Bidouwberg, also below spurs of the Gifberg.

The name *R. biflora* Schltr. appears on several sheets of *Schlechter 8694*, but does not seem to have been published. The name *R. hirsuta* Eckl. var. *biflora* Beg. appears on a sheet of *Schlechter 8694* in B, but no publication of this name combination has been found; Béguinot (1909) published it ultimately as a variety of *R. ambigua*. The species is, however, not allied to *R. ambigua*, nor is it a hybrid as Béguinot thought. It is allied to *R. hirsuta*. Its corm, however, is asymmetrical, with the basal ridge not forming a complete circle, and the leaf has two small extra vascular bundles in each lateral rib and no papillae in the grooves. It has therefore been made a distinct species as Schlechter intended it to be.

Specimens found near Vanrhynsdorp differ slightly from the typical specimens. The cup of the flower is less yellow, the blotches in the throat are violet instead of purple, and the stigmas are often violet and usually overtop the anthers. They have nevertheless been included in this species, as they fit best here.

7. **Romulea namaquensis** De Vos, Jl S. Afr. Bot. 21: 103 (1955).

Plants 7—20 cm tall. *Corm* 6—10 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with minute parallel fibrils on the basal ridge, and apical fibres 3—8 mm long. *Stem* short and hidden by sheathing leaf bases, or up to 80 mm long or rarely longer, erect, shortly extending. *Basal sheaths* 1—2, 10—50 mm long. *Basal leaves* 2—3 in long-stemmed forms, filiform, 7—20 cm long, 0,5—1 mm diam., suberect or curved and flexuose, grooves very narrow, sheathing leaf bases 2—4 mm wide; *cauline leaf* 1 or rarely 2, somewhat shorter than the basal leaves. *Peduncles* 20—60 mm long, semiterete, erect or suberect. *Bract* green, with very narrow, hardly visible membranous margins, narrowly ovate, 12—30 mm long, rarely longer, subobtuse to acuminate, with slender closely spaced veins, sometimes keeled in upper part. *Bracteole* green with wide, white or brown-edged or brown-streaked membranous margins narrowing to a green, obtuse or

minutely emarginate tip, sometimes shorter than bract. *Flowers* 1—3, 20—50 mm long. *Perigone tube* 4—12 mm long, narrowly funnel-shaped; *segments* narrowly obovate or narrowly elliptical, 16—40 mm long, 5—10 mm wide, acute to obtuse or minutely emarginate, shiny, rose to salmon-pink (RHS 31C, 37B, C) rarely white, sometimes pale yellow deep down in tube, with small blotches or 3—5 reddish-black veins in throat; outer segments on backs irregularly blotched in pink and yellow. *Stamens* erect, inserted above middle of perigone tube; *filaments* 4—10 mm long, yellow or maroon, minutely pilose at the bases; *anthers* 5—10 mm long, golden-yellow. *Style* 8—20 mm long; *stigmas* 2—3 mm long, reaching the anther tips or slightly higher or lower. *Capsules* shortly cylindrical, up to 12 mm long, on suberect peduncles.

Holotype: *Pearson, P. Sladen Mem. Exp. 6656* in Bol. Isotype in K.

Flowering period July to September, depending on the rains.

On sandy or stony ground.

The description of *R. namaquensis* has now been amplified to include a second subspecies which is closely allied to the first. They have similar corms, leaf structure, bracts and bracteoles, and insertion of the stamens. They differ chiefly in the length of the perianth tube, the filaments and styles. Some collections, e.g. *Marloth 13272*, with perianth tubes 5—10 mm long and somewhat flexuose leaves, are intermediate and can hardly be placed. This collection has been placed tentatively with subsp. *bolusii*.

The typical subspecies has been found chiefly in the Kamiesberg and its foothills near Kamieskroon. Subspecies *bolusii* has a somewhat wider range, with a distribution from about 10 miles NNW of Garies, up to O'okiep, and with a white form found north-west of Steinkopf. The distribution of the two subspecies overlaps in the Kamiesberg area.

KEY TO THE SUBSPECIES

1 Perigone tube 7—12 mm long; filaments 6—10 mm long; style 16—20 mm long; leaves curved, flexuose a. Subsp. *namaquensis*

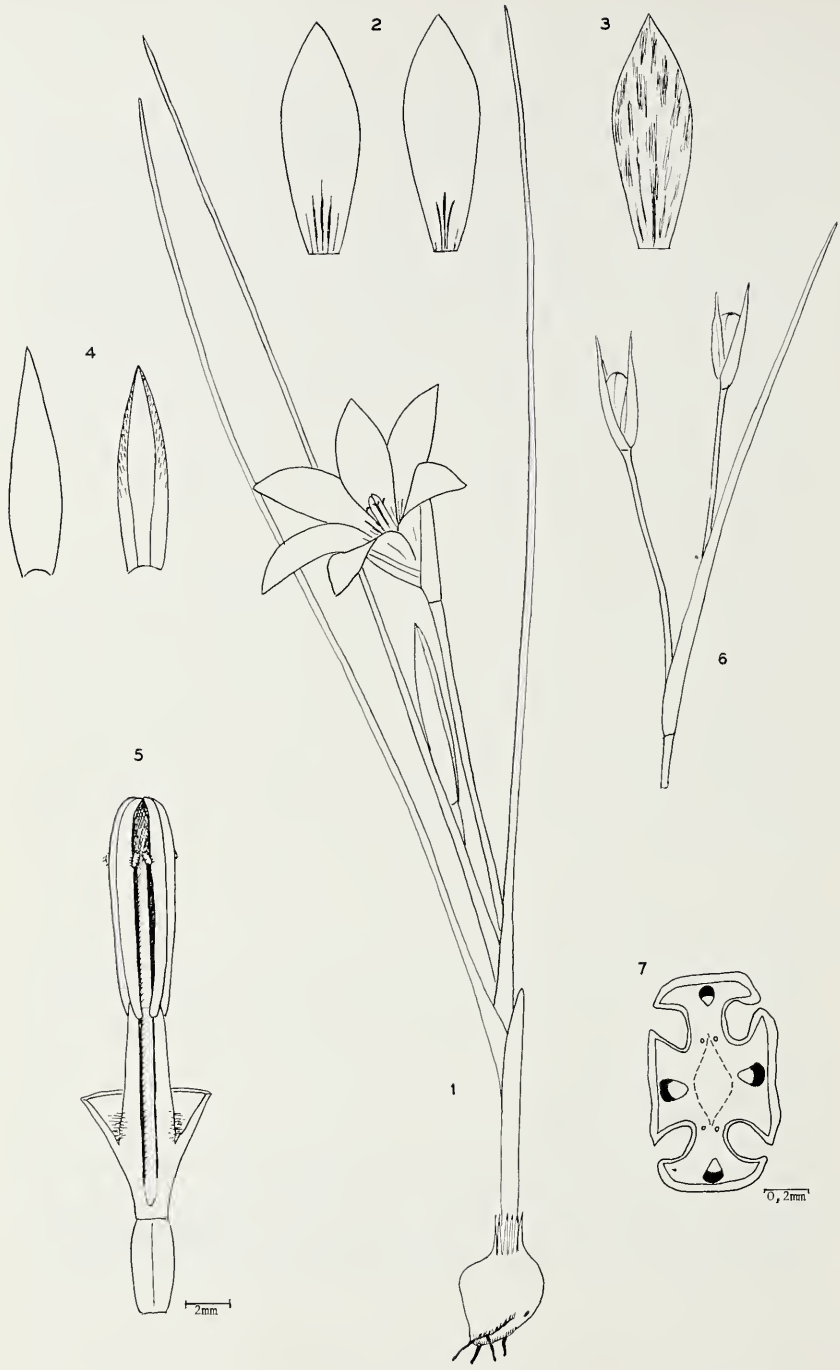
1 Perigone tube 4—8 mm long, sometimes to 10 mm in large flowers; filaments usually 4—6 mm long rarely to 8 mm; style 10—16 mm, rarely longer; leaves suberect. b. Subsp. *bolusii*

a. Subsp. **namaquensis**

R. namaquensis De Vos 1955 p. 103.

Icon: de Vos 1955 p. 105.

Leaves less than 1 mm diam., curved, flexuose. *Bract* and *bracteole* 15—25 mm long, the bracteole with white or brown-edged membranous margins. *Flowers* 30—45 mm long. *Perigone tube* 7—12 mm long; *segments* 20—28 mm long, less than 10 mm wide, rosy-pink, obtuse to subacute or minutely emarginate. *Filaments* 6—10 mm long, yellow; *anthers* 6—9 mm. *Style* 16—20 mm.


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3
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5
6
7
2mm
0,2mm

NAMAQUALAND. Kamiesberg between Witsand and Leliefontein: *Pearson P. Sladen Mem. Exp. 6656.* Kamieskroon: *Esterhuysen 5460* (BOL), *Compton 11170* (NBG). Kloof near Kamieskroon: *Leipoldt 3831* (BOL). Near Kamieskroon towards Leliefontein: *de Vos 1617.*

WITHOUT LOCALITY. ?*Drège 2636a* (S partly, not in B, G, K or P).

This subspecies with its rather long perianth tube, seems to connect subsp. *bolusii* and *R. kamisensis*, the latter with a perianth tube much longer than the segments.

Drège's collection *2636a* in S is probably this subspecies. It shows the bracteole with colourless membranous margins and, as far as can be seen, a rather long perianth tube, which is, however, shorter than the still pinkish perianth segments. *Drège 2636* in the Lübeck herbarium in B is the type of *R. tubata*, which Klatt (1882) described as follows: "Spathae 10 lin longae. Perigonii tubus 10 lin longus, laciniae 4 lin longae", and "floribus luteis". This collection was unobtainable from B and was probably destroyed during the war. The *Drège 2636a* collection in S does not fit Klatt's description of *R. tubata* (see under Excluded Species).

b. Subsp. **bolusii** De Vos subsp. nov.

R. rosea auct. non Eckl.: Baker 1896 p. 41 pro parte.

A subspecie typica foliis suberectis, tubo perigonii breviore, 4—8 mm longo, filamentis 4—5 mm longis, stylo 10—15 mm longo, distinguitur.

Holotype: *Bolus 6620* sub *R. rosea* in STE. Isotypes in BOL and K.

Leaves ca. 1 mm diam. or less, suberect. *Bract* 12—30 mm long acute, rarely to 40 mm long and then keeled in upper half and acuminate. *Bracteole* sometimes shorter, with white or brown-edged or brown-streaked membranous margins. *Flowers* 20—50 mm long, sometimes to 55 mm, rarely white. *Perigone tube* 4—8 mm long rarely to 10 mm; *segments* 16—40 mm long, 5—12 mm wide, salmon-pink or rosy, acute to subobtuse. *Filaments* 4—6 mm long, rarely to 8 mm, often maroon; *anthers* 5—10 mm. *Style* 10—15 mm long, rarely longer. *Chromosome number* 2n = 26 (*de Vos 2173*).

NAMAQUALAND. Near O'okiep: *H. Bolus 6620.* Garies-O'okiep: *Marloth 6742* (PRE, STE). Brakdam: *Esterhuysen 5453* (BOL), *Bond 1144* (NBG). Grootvlei: *de Vos 2173.* Between Uitkomst and Geelbekskraal: *Drège 2637, 2637b* (S). Uitkomst: ?*Drège 2637a* (K, L). 4 mls. NW by W of Steinkopf: *Acocks 19358* (PRE, K). Grootvalley, 7 mls. W of Kamieskroon: *Oliver STE 30282.* Kamieskroon: *Marloth 13272* (PRE, STE). 14 mls. SW of Springbok: *Acocks 19329* (PRE).

WITHOUT LOCALITY. ?*Drège 2636* (G, K, P partly, not S). *Drège 2637a* (G, K, P), *2637b* (GRA, BM, OXF, P). *Hb. Forsyth* sub *R. rosea* (K).

The type, *Bolus 6620*, has been included with *R. rosea* Eckl. in Fl. Cap. (1896). It differs from the latter in its corm, leaf structure, sometimes elongating stem, and filaments which are inserted halfway up the perianth tube.

This subspecies can be readily distinguished by its generally apricot-pink perianth, its usually short tube with hardly any yellow in the cup, by its green bract and bracteole, the latter with wide membranous margins, its frequently

FIG. 18.

R. namaquensis ssp. *bolusii* (*de Vos* no. *2173*). 1, plant × 1. 2, outer and inner perianth segments, upper surface. 3, outer segment, lower surface. 4, bract and bracteole × 1. 5, pistil, stamens and perianth tube. 6, ripening capsules × 1. 7, transverse section of leaf.



FIG. 19.

R. kamisensis (*de Vos* no. *2232*). 1, plant ×1. 2, outer and inner perianth segments, upper surface. 3, outer segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, almost mature capsules ×1. 7, transverse section of leaf.

elongating stem with, often, three basal leaves, and its ciliata corm type.

It differs from *R. schlechteri* in its more apricot-pinkish perianth with less yellow in the cup, somewhat narrower leaves with narrower leaf bases, often brown-edged bracteoles, and often red filaments which are inserted halfway up the perianth tube.

The length of the perianth tube varies. In larger flowers, 50—55 mm in length, the tube increases from 7 mm up to 10 mm during the six days of flowering, and the whole flower increases 10 mm in length.

The *Drège* collections cited above are nearest this subspecies. Their flower colour could not be determined, except for no. *2637b* in BM, where there is a loose yellow flower in a separate envelope. No. *2637a* and *b* have been variously identified as *R. pudica*, *R. rosea* var. *speciosa*, and *R. filifolia*, but they do not belong to any of these species.

8. **R. kamisensis** De Vos sp. nov.

Fig. 9, 19.

Cormus 7—15 mm diam., basi oblique complanatus, crista lunata ciliata, tunicis rigidis laevibus brunneis, apice fibris 3—5 mm longis praedito. *Caulis* perbrevis obtectus, vel ad 50 mm longus e vaginis foliorum breviter exsertus. *Vaginae basilares* 1—2. *Folia basilaria* 2—3 in plantis longicaulibus, filiformia, 10—15 cm longa, 0,5—1 mm diam., suberecta vel plerumque curvata flexuosa, sulcis perangustis, basibus vaginantibus 3—4 mm latis; *folia caulina* 1—2, parum breviora quam folia basilaria. *Pedunculi* 20—35 mm longi, semiteretes, erecti vel suberecti. *Bractea* viridis, marginibus membranaceis perangustis aegre manifestis, anguste ovata, aliquantum concava 13—22 mm longa subacuta vel subobtusa, dense et anguste nervata, bases segmentorum perigonialis attingens. *Bracteola* viridis marginibus membranaceis latis albis, raro paucipunctatis, in apicem viridem decrescentibus. *Flores* 1—2, 30—40 mm longi. *Tubus perigonii* 17—22 mm longus infundibularis, basi angustus, sursum dilatatus; *segmenta* anguste obovata vel anguste elliptica, 11—16 mm longa 3,5—5 mm lata, acuta, magenteo-purpurea, macula violacea et violaceo-nervata, in fauce striis albis et purpureis praedita, segmenta exteriora a dorso purpurea, dilute nervata, basi utrinque albida. *Stamina* erecta, supra dimidium tubi perigonialis inserta, inclusa, bases segmentorum attingentia; *filamenta* 4—5 mm longa glabra flava; *antherae* 4—5 mm longae luteae. *Stylus* 15—16 mm longus; *stigmata* 2,5 mm longa, apices antherarum attingentia vel inferiora. *Capsulae* cylindricae 10—12 mm longae, in pedunculis suberectis.

Holotype: *Stayner* s.n. 26-8-1968 in NBG.

Plants 10—15 cm tall. *Corm* 7—15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown,

with minute parallel fibrils on the basal ridge and apical fibres 3—5 mm long. *Stem* very short and hidden, or up to 50 mm long, shortly extending from sheathing leaf bases. *Basal sheaths* 1—2, up to 50 mm long. *Basal leaves* 2—3 in long-stemmed forms, filiform, 10—15 cm long, 0,5—1 mm diam., suberect or mostly bent and flexuose, grooves very narrow, sheathing leaf bases 3—4 mm wide; *cauline leaves* 1—2, somewhat shorter than the basal leaves. *Peduncles* 20—35 mm long, semiterete, erect or suberect. *Bract* green with very narrow, hardly visible membranous margins, narrowly ovate, somewhat concave, 13—22 mm long, subacute to subobtuse with slender, closely-spaced veins, reaching to bases of perigone segments. *Bracteole* green with wide, white membranous margins rarely with a few brown specks, narrowing to a green tip. *Flowers* 1—2, 30—40 mm long. *Perigone tube* 17—22 mm long, funnel-shaped, narrow at base, widening gradually upwards; *segments* narrowly obovate or narrowly elliptical, 11—16 mm long, 3,5—5 mm wide, acute, magenta-purple (RHS 72A), with a violet blotch and violet veins, the throat with white and purple stripes, outer segments on the backs purple with faint veins and a whitish spot on each side at the bases. *Stamens* erect, inserted above the middle of the perigone tube where it widens, included, reaching to the bases of the segments; *filaments* 4—5 mm long, glabrous, pale yellow; *anthers* 4—5 mm long, golden-yellow. *Style* 15—16 mm long; *stigmas* 2,5 mm long, reaching the anther tips or lower. *Capsules* cylindrical, 10—12 mm long, on suberect peduncles. *Chromosome number* 2n = ca 26 (*de Vos 2232*).

NAMAQUALAND. Studer's Pass (Platbakkies and Garies): *Stayner* 26-8-1968. Between Garies and Bitterfontein: *Leipoldt 3832* (BOL). Beacon Hill, Kamiesberg: *Pearson, Sladen Mem. Exp. 6671* (BOL). Kamiesberg near Kamieskroon: *de Vos 2232*.

Flowering period August to September.

This rare species, known from only four collections, is apparently quite widely distributed in Namaqualand. It occurs on sandy loam.

It is readily recognisable by its magenta-purple flowers with a funnel-shaped perianth tube which is longer than the segments, and with the style and stamens included in the tube, by its long green bract and bracteole, the latter with white membranous margins and a green tip, by very narrow leaves, and a corm of the ciliata type. It is allied to *R. namaquensis*, and differs in its longer perianth tube and shorter segments, glabrous filaments, and in its anthers and stigmas which are not or hardly exserted from the perianth tube.

Its corm, leaf structure, flower shape, bract and bracteole and chromosome number show that the species is not closely allied to most of the other long-tubed Romulea species, namely *R. macowanii* and *R. syringodeoflora*. It has therefore been grouped with the Ciliatae on account of its corm type and leaf structure.

R. kamisensis is not the same as *R. tubata* Klatt, which Klatt described

(1882 p. 401) as having yellow flowers with a perigone tube 10 lin. long and segments 4 lin. long (see under Excluded Species).

9. **R. elliptica** De Vos, sp. nov.
Fig. 20.

Cormus ca. 10 mm diam. basi oblique complanatus crista lunata ciliolata, tunicis rigidis laevibus brunneis, apice fibris ca. 2 mm longis praedito. *Caulis* brevis vel ad 16 cm longus erectus saepe supra terram extensus. *Vaginae basilares* 1—2. *Folia basilaria* 2, filiformia, 15—30 cm longa ca. 1—1,5 mm diam., suberecta, sulcis angustis, basibus vaginantibus 3—4 mm latis; *folia caulina* 1—2, breviora, basibus parum latioribus quam foliis basilaribus. *Pedunculi* 10—30 mm longi semiteretes suberecti. *Bractea* viridis, anguste triangularis, 15—25 mm longa, aliquantum conduplicata in dimidio superiore, subacuta vel acuminata. *Bracteola* aliquando parum brevior quam bractea, viridis, marginibus membranaceis angustis albis, basi submembranacea. *Flores* plerumque 2—4, 25—35 mm longi. *Tubus perigonii* 4—5 mm longus, infundibularis; *segmenta* anguste elliptica plerumque obtusa, 18—27 mm longa 5—9 mm lata, vivide lutea, basi breviter atrato-nervata, segmenta exteriora a dorso viridia, marginibus fusco-notatis, parum longiora et angustiora quam interiora. *Stamina* erecta, prope basin perigonii inserta; *filamenta* 6—7 mm longa, basi pilosa, ad apices minute pilosa; *antherae* 4—6 mm longae luteae. *Stylus* 10—12 mm longus; *stigmata* apices antherarum attingentia. *Capsulae* cylindricae ad 18 mm longae, in pedunculis rectis et aliquantum patentibus.

Holotype: *de Vos 2226* in STE.

Plants 15—30 cm tall. *Corm* up to 10 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with a fringe of minute parallel fibrils on the basal ridge, apical fibres ca. 2 mm long. *Stem* short or up to 16 cm long, erect, often extending above-ground. *Basal sheaths* 1—2, 20—40 mm long. *Basal leaves* 2, filiform, 15—30 cm long, ca 1—1,5 mm diam., suberect, grooves narrow, sheathing leaf bases 3—4 mm wide; *cauline leaves* 1—2, shorter and with slightly wider leaf bases than in basal leaves. *Peduncles* 10—30 mm long, semiterete, suberect. *Bract* green, narrowly triangular, 13—25 mm long, somewhat conduplicate in upper half, subacute to acuminate. *Bracteole* sometimes slightly shorter than bract, green with narrow, white membranous margins and submembranous base. *Flowers* generally 2—4, 25—35 mm long. *Perigone tube* 4—5 mm long, funnel-shaped; *segments* mostly obtuse, 18—27 mm long, 5—9 mm wide, bright golden-yellow (RHS 7A), with a few short dark veins in cup, the outer segments narrowly elliptical, green on backs with some brown markings along the margins, slightly longer and narrower than the inner. *Stamens* erect, inserted near the base of



FIG. 20.

R. elliptica (*de Vos* no. *2226*). 1, plant ×1. 2, outer perianth segment, lower surface. 3, outer and inner segments, upper surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, almost mature capsules ×1. 7, transverse section of leaf.

the perigone tube; *filaments* 6—7 mm long, pilose at base and minutely pilose almost to the tops; *anthers* 4—6 mm long, golden-yellow. *Style* 10—12 mm long; *stigmas* 2 mm long, reaching the anther tips or slightly higher. *Capsules* cylindrical, up to 18 mm long, on straight and slightly patent peduncles. *Chromosome number* 2n = 24 (*de Vos 2017*).

VREDENBURG. Between Saldanha and Vredenburg: *de Vos 2017*. Windheuwel, near Vredenburg: *de Vos 2226*.

Flowering period August.

On white sandy soil.

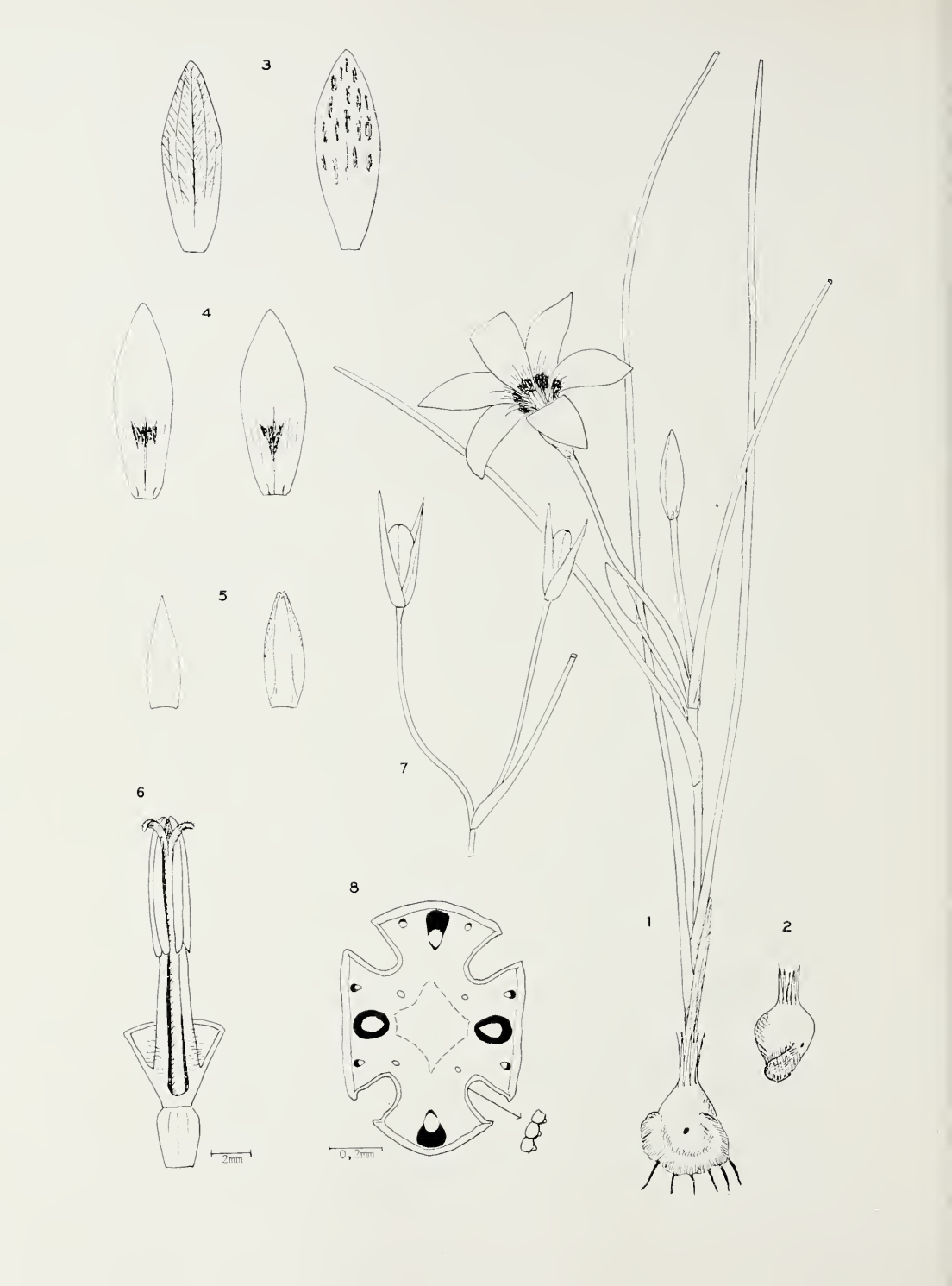
This new species, found only in a single locality, is readily distinguished by its corm of the ciliata type, generally elongated stem with two basal leaves, yellow flowers with narrow, elliptical, obtuse perianth segments, green bract which is somewhat conduplicately folded in its upper half, and green bracteole with white membranous margins. It forms large cylindrical capsules, with large numbers of seeds which germinate readily.

It is allied to the white-flowered form of *R. schlechteri* which occurs in neighbouring districts, and it also shows some alliance with the sympatric *R. saldanhensis*. From the former it differs in the shape and colour of the perianth segments and in its more pilose filaments. From *R. saldanhensis* it differs somewhat more: in the possession of two basal leaves with an absence of papillae in the grooves, in the shape of the perianth segments, in the bract which is somewhat conduplicate towards its top, and in the greener bracteole.

10. **R. sulphurea** Béguinot, Bot. Jb. 38: 331 (1907a) et 1907b p. 475 et 1908a p. 160 et 1909 p. 100.

R. aurea auct. non Klatt: Schltr. ined., on herbarium sheets of *Schlechter 10818* in some herbaria. This name was probably never published. The name *R. sublutea* (Lam.) Bkr. var. *sulphurea* Beg. appears on a herbarium sheet of *Schlechter 10818* in B, but the varietal epithet was probably not published.

Plants 5—15 cm tall. *Corm* 4—6 mm diam., obliquely flattened towards the base with a small crescent-shaped basal ridge; tunics hard, smooth, light brown, with minute parallel fibrils on the basal ridge and apical fibres 2—4 mm long. *Stem* short or to 35 mm long, hardly extending from the leaf bases. *Basal sheaths* 1—2, 10—40 mm long. *Basal leaves* 2 or apparently more in short-stemmed forms, filiform, 5—15 cm long, less than 1 mm diam., bent or suberect, ribs and grooves hardly visible, sheathing leaf bases 2—3 mm wide; *cauline leaves* often 2, shorter than basal leaves, leaf sheaths 3—4 mm wide. *Peduncles* 7—20 mm long, semiterete, erect. *Bract* green with narrow membranous margins, ovate, 7—10 mm long, obtuse or appearing acute on account of inrolling of margins. *Bracteole* green or greenish, with wide membranous margins brown-speckled towards the edges and narrowing to a green tip, subobtuse or minutely


3
4
5
6
7
8
1
2
2mm
0,2mm

emarginate. *Flowers* 1—3, 15—25 mm long. *Perigone tube* 4—5 mm long, funnel-shaped; *segments* narrowly obovate-elliptical, 12—20 mm long, 3,5—5 mm wide, subacute to subobtuse, sulphur-yellow with linear-oblong marks which are often produced into the tube and are rarely absent, outer segments with a purple spot on each side at the bases, yellow-purple on the backs with purple veining. *Stamens* erect, inserted near base of perigone tube, reaching halfway or higher up the perigone, yellow; *filaments* 6—9 mm long, pilose to their tops; *anthers* 2,5—3 mm long. *Style* 8—11 mm long; *stigmas* reaching to anther tips. *Capsules* obovoid in half-ripe stage, on curved peduncles.

Type: Béguinot cited three isotypes of *Schlechter 10818*. That in Z is chosen as lectotype. Isotypes in BOL, GRA, PRE, B, BM, G, K, S, etc.

CLANWILLIAM. Pakhuisberg: *Schlechter 10818*.

Flowering period August.

Amongst rocks on the Pakhuisberge.

This species which has never been found again after its discovery in 1897, is characterised by a corm of the ciliata type, short or slightly elongated stem, yellow perianth with dark markings, very short anthers reaching high up the perianth, and filaments which are pilose up to their tips and about twice as long as the anthers. Béguinot considered it to be related to *R. sublutea* (i.e. *R. triflora*), but its corm shows it to belong to the subsection Ciliatae.

It resembles *R. setifolia* superficially, but differs in its fringe of slender, parallel fibrils at the base of the corm, in its bracteole with generally wider membranous margins, and in its proportionally short anthers and long filaments.

The yellow colour of its perianth has been well preserved in herbarium specimens, but the dark marks recorded by Béguinot have faded, except for the lateral marking at the bases of the segments.

11. **R. montana** Schltr. ex Béguinot, Bot. Jb. 38: 332 (1907a) et 1907b p. 112, et p. 475 et 1909 p. 100; de Vos 1965: 139.

R. rosea Eckl. var. *flavescens* Béguinot 1909 p. 63—holotype: *Mundt & Maire 580* (B). *R. hirsuta* Eckl. var. *aurantiaca* Schlechter 1900 p. 90—type: *Schlechter 8847* (B holo; BOL, GRA, PRE partly, BM, K, Z). *R. ambigua* Beg. var. *aurantiaca* (Schltr.) Béguinot 1909 p. 80—type: *Schlechter 8847* (B, etc.).

Plants 8—30 cm tall. *Corm* obliquely subcampanulate, 5—15 mm diam., obliquely flattened at the base, with a wide, crescent-shaped basal ridge which sometimes forms an almost complete circle; tunics hard, smooth or with a rough surface, brown, with fine parallel fibrils often irregularly grouped on the basal ridge, and apical fibres and teeth 5—10 mm long. *Stem* up to 15 cm long, erect, extending above-ground, or short and hidden by the leaf bases. *Basal*

FIG. 21.

R. montana (*de Vos* no. *1925*). 1, plant $\times \frac{7}{8}$. 2, younger corm. 3, outer perianth segments of two plants, lower surface. 4, outer and inner segments, upper surface. 5, bract and bracteole $\times 1$. 6, pistil, stamens, and perianth tube. 7, almost mature capsules $\times 1$. 8, transverse section of leaf.

sheath usually 1, 10—60 mm long. *Basal leaves* usually 2 or seemingly more in short-stemmed forms, filiform, 6—30 cm long, 0,5—1 mm diam., arcuate or slightly bent, grooves rather narrow, sheathing leaf bases 3—5 mm wide; *cauline leaves* 2 or sometimes more, shorter than the basal leaves. *Peduncles* 10—60 mm long, almost semiterete, suberect or slightly curved. *Bract* green, sometimes brown-edged, narrowly ovate to almost narrowly triangular, 10—22 mm long, acute to obtuse, with slender veins rather widely spaced. *Bracteole* green with wide brown-edged or brownish membranous margins, sometimes emarginate. *Flowers* usually 2—3, sometimes 1—5, 20—45 mm long. *Perigone tube* 4—6 mm long, funnel-shaped; *segments* narrowly obovate to narrowly elliptical 15—35 mm long, 5—10 mm wide, obtuse to subacute, shiny buttercup-yellow (RHS 11A), with dark brown blotches in the throat which are often reduced to dark veins or are sometimes absent, outer segments on the backs brown or reddish-brown or with faint feathered veining, inner segments sometimes with a dark median line on the backs and a dark tip. *Stamens* erect, inserted near base of perigone tube, yellow; *filaments* 5—6 mm long, widening slightly downwards, pilose at the base and often in the lower half; *anthers* 4—8 mm long. *Style* 10—15 mm long; *stigmas* reaching more or less to the anther tips. *Capsules* 8—10 mm long, shortly cylindrical, on widely patent peduncles *Chromosome number* 2n = 24 (*de Vos 1697, 1925, 2167*).

Holotype: *Schlechter 10949* in G. Isotypes in BOL, GRA, PRE, B, K, S, US, Z, etc.

CALVINIA. Nieuwoudtville: *Loubser 949* (NBG). Near Nieuwoudtville: *L. Bolus BOL 20519, Burger STE 30202.* Onderbokkeveld, Oorlogskloof: *Schlechter 10949.* Between Nieuwoudtville and Oorlogskloof: *Leipoldt 3825* (BOL). 3 mls. W of Nieuwoudtville: *Lewis 2013* (SAM), *Lewis & Davis SAM 61060, Barker 6478* (NBG). 15 mls. E of Nieuwoudtville: *Maguire 210* (NBG). Top of Vanrhyns Pass: *Barker 1971* (NBG), *de Vos 1697, 1925.*

VANRHYNSDORP. Vanrhynsdorp-Bokkeveld: *Pritzel* s.n. (Z).

CLANWILLIAM. Matjiesrivier: *Schlechter 8847* (BOL, GRA, PRE partly, B, BM, K, Z). Grootrivierhoogte: *de Vos 2180.* Pakhuisberg: *Schlechter 8648* (PRE but not in other herbaria). Bidouwberg: *de Vos 2167.* Citadel Kop: *Compton 24238* (NBG). Olifantsrivier: *Schlechter 8002* (BOL, GRA, PRE, BM, K).

WITHOUT LOCALITY. *Mundt & Maire 580* (B).

Flowering period July to September.

In stony ground at altitudes of ca. 600—700 m or more.

This species is characterised by a corm with, generally, a wide, oblique, crescent-shaped basal ridge on which the tunics break up into irregular groups of parallel fibrils, a short or elongated stem, green bracts and bracteoles, the latter with wide brownish or brown-edged membranous margins, and golden-yellow flowers, sometimes with dark blotches in their throats. If the stem is elongated there are two basal leaves.

R. montana seems to link the Ciliatae with the Tortuosae. In *R. montana* the ridge on the corm is usually wider in diameter than the corm itself, but is

not as wide as in *R. tortuosa*. The fibrils on the ridge are often collected into irregular groups as in *R. tortuosa*, and the older the plant is, the more its corm resembles that of *R. tortuosa*. It differs from the latter, however, in its green bract and bracteole, leaves not spirally twisted, and in the frequently elongated stem. From *R. austinii* it is also distinguished by its greener bract and frequently elongated stem, as well as by its corm tunics which often have a rather rough surface, and by its filaments which are pilose in their lower halves and only slightly widened towards their bases.

It also differs from the two above-mentioned species in its leaf structure: the upper *halves* of the basal leaves are unifacial and each lateral leaf rib has three vascular bundles (to be seen in transverse sections).

The flowers of *R. montana* resemble those of *R. setifolia* var. *ceresiana* and the sympatric *R. monticola*. *R. montana* differs, however, in the basal fibrils of the corm, in chromosome number, and in details of leaf structure: it has the above-mentioned three superficial vascular bundles in the lateral ribs, very sharply angled rib margins, and often minute papillae in the grooves, which *R. setifolia* var. *ceresiana* does not possess. *R. monticola*, on the other hand, has its rib margins strengthened by fibre strands, and has well-developed papillae in the grooves of the leaves.

Schlechter 8847, which Schlechter named *R. hirsuta* Eckl. var. *aurantiaca* and Béguinot placed with *R. ambigua*, was identified by Phillips as *R. austinii*. The specimens fit better into *R. montana*, although the basal ridge of the corm is slightly narrower than in the type specimens of *R. montana*, and the veins in the bracts somewhat stronger. From *R. austinii* it differs more (see under *R. austinii*).

12. **R. toximontana** De Vos sp. nov.
Fig. 22.

Cormus 10—15 mm latus, basi oblique complanatus, crista basilari lata flabellata vel lunata, tunicis rigidis laevibus brunneis, fibrillis in crista parallelis saepe irregulariter aggregatis, apice fibris 5—10 mm longis praedito. *Caulis* ad 100 mm longus erectus, supra terram extensus, vel interdum brevis obtectus. *Vagina basilaris* 1. *Folia basilaria* plerumque 2 vel apparenter plura in plantis brevicaulibus, filiformia, bifacialia in dimidio inferiore, 10—25 cm longa, ca. 1 mm diam., arcuata vel leviter flexa, interdum sparsim ciliolata in marginibus porcarum, sulcis angustis, basibus vaginantibus 2—3 mm latis; *folia caulina* 1—3, breviora foliis basilaribus. *Pedunculi* semiteretes 10—30 mm longi, suberecti vel curvati. *Bractea* viridis, marginibus membranaceis perangustis, fere anguste triangularis, 10—20 mm longa acuta vel subacuta angustinervis. *Bracteola* viridis, marginibus membranaceis latis brunneo-marginatis decrescentibus ad apicem viridem interdum emarginatum. *Flores* 1—3 interdum 4, 18—30

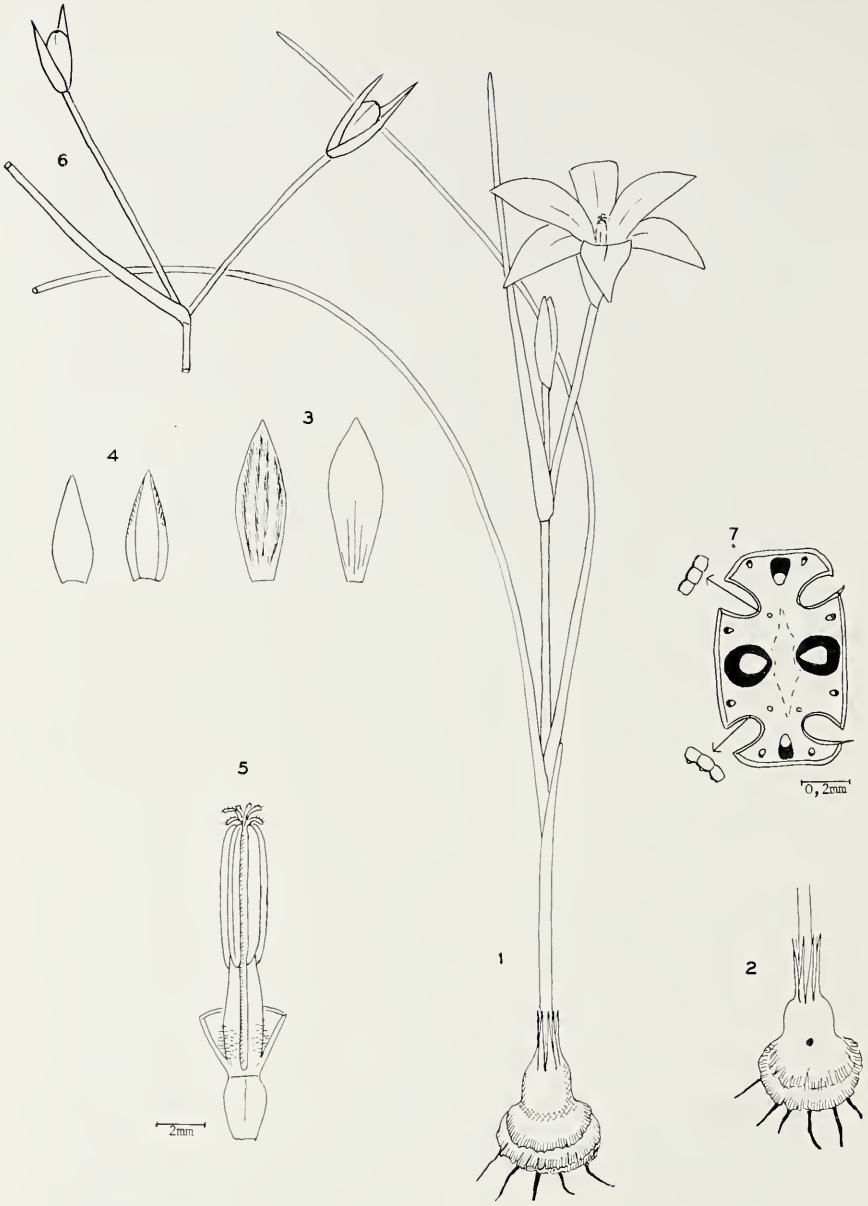


FIG. 22.

R. toximontana (*de Vos* no. *2020*). 1, plant ×1. 2, corm seen from opposite side. 3, outer perianth segments, lower and upper surfaces. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, almost mature capsules ×1. 7, transverse section of leaf.

mm longi. *Tubus perigonii* 4—5 mm longus infundibularis; *segmenta* 13—22 mm longa, 4—9 mm lata, subobtusa eburnea, basi lutea, segmenta interiora anguste obovata, exteriora anguste elliptica a dorso viridia vel purpurea vel irregulariter maculata, pallide mediano-lineata. *Stamina* erecta prope basin perigonii inserta; *filamenta* 3—5 mm longa, in dimidio inferiore vel fere ad apices minute pilosa, aurantiaca; *antherae* 4—6 mm longae flavidae. *Stylus* 7—10 mm longus; *stigmata* ad apices antherarum attingentia flavida. *Capsulae* ellipsoideae, ca. 5—8 mm longae, in pedunculis patentissimis.

Holotype: *de Vos 2020* in STE.

Plants 10—25 cm tall. *Corm* 10—15 mm wide, obliquely flattened towards the base, with a wide, fan-shaped or crescent-shaped basal ridge; tunics hard, smooth, brown, with parallel fibrils often irregularly grouped on the basal ridge, and apical fibrils and teeth 5—10 mm long. *Stem* up to 100 mm long, erect, extending above-ground, or sometimes short and hidden. *Basal sheath* 1, 10—50 mm long. *Basal leaves* mostly 2 or seemingly more in short-stemmed forms, filiform, bifacial in the lower half, 10—25 cm long, ca. 1 mm diam., arcuate or slightly bent, sometimes minutely and sparsely ciliate on the rib margins, grooves narrow, sheathing leaf bases 2—3 mm wide; *cauline leaves* 1—3, shorter than the basal leaves. *Peduncles* semiterete, 10—30 mm long, suberect or curved. *Bract* green with very narrow membranous margins, almost narrowly triangular, 10—20 mm long, acute or subacute, with slender veins. *Bracteole* green with wide, brown-edged membranous margins narrowing to a green or sometimes emarginate tip. *Flowers* 1—3 or sometimes 4, 18—30 mm long. *Perigone tube* 4—5 mm long, funnel-shaped; *segments* 13—22 mm long, 4—9 mm wide, subobtuse, cream inside, with orange-yellow bases and an orange cup, inner segments narrowly obovate, outer narrowly elliptical, green on the backs or purple or irregularly blotched and with a pale median line. *Stamens* erect, inserted near the base of the perigone tube; *filaments* 3—5 mm long, minutely pilose in the lower half or almost to the tops, orange-yellow; *anthers* 4—6 mm long, pale yellow. *Style* 7—10 mm long; *stigmas* at the anther tips, pale yellow. *Capsules* ellipsoid, 5—8 mm long, on widely patent peduncles. *Chromosome number* 2n = ca 28 (*de Vos 2020*).

VANRHYNSDORP. Gifberg, plateau on summit: *de Vos 2020, 2176*. Three-quarters up Gifberg Pass: *Marsh 510* (STE).

CALVINIA. Between Nieuwoudtville and Vanrhyns Pass: *Lewis 2005* (SAM).

Flowering period August.

On sandy, TMS soil, at about 500—750 m altitude.

After the discovery of this rare new species, it was at first thought to be a white colour variation of *R. montana*, as it resembles the latter species in vegetative characters. Against this view is the fact that attempts to cross-breed the two species produced only 20 apparently normal seeds amongst large

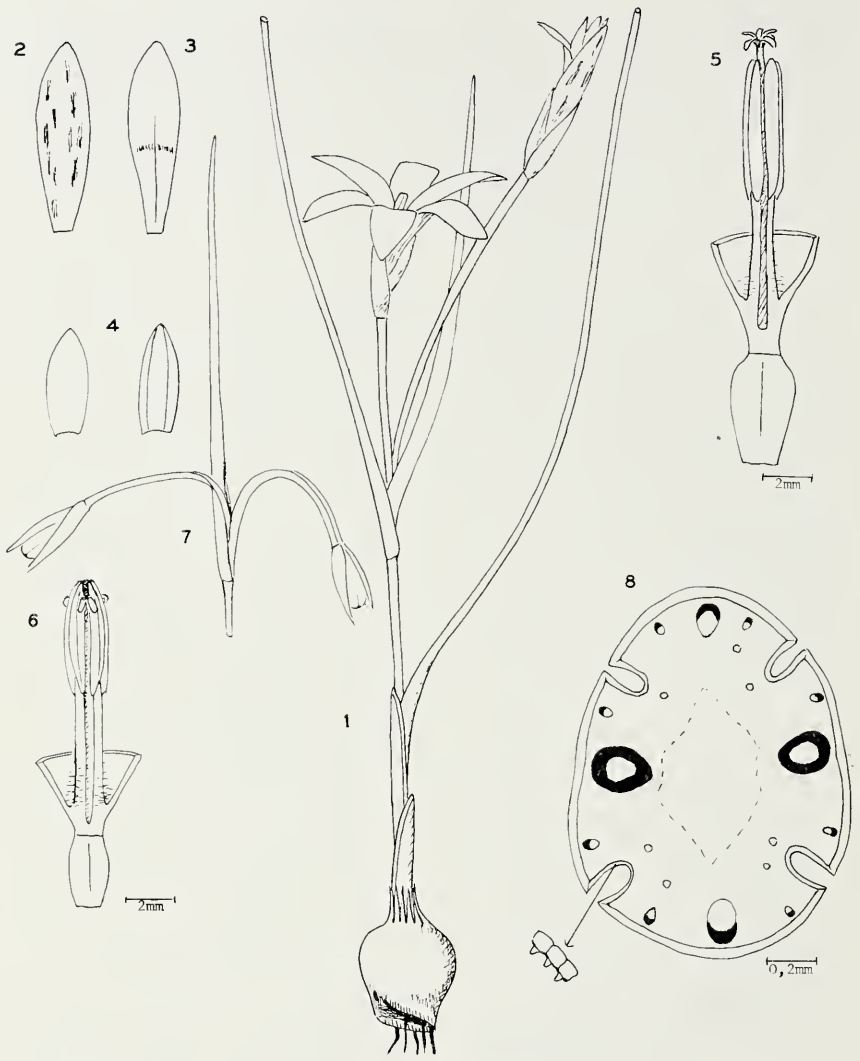


FIG. 23.

R. tabularis (*de Vos* no. *1690*). 1, plant ×1. 2, outer perianth segment, lower surface. 3, perianth segment, upper surface. 4, bract and bracteole ×1. 5, 6, pistil, stamens, and perianth tube of long-styled and short-styled forms. 7, ripening capsules. 8, transverse section of leaf.

numbers of shrivelled ones. Only five seeds germinated, producing small, weak plants which died off in the second season without forming more than a single small leaf. Later it was also found that the chromosome numbers of the two species differ. *R. toximontana* is, therefore, a distinct species which differs from *R. montana* in chromosome number, flower colour, its pale anthers, and its peduncles which are not so widely patent in the fruiting stage.

R. toximontana also shows a relationship with the sympatric *R. sladenii*, and the two species can be confused, as the flowers, bracts, and bracteoles are very similar. They are readily distinguished by the shape of their corms and by their fruiting peduncles, the pairs of peduncles in *R. toximontana* diverging at an angle of about 90°, while those of *R. sladenii* bend to the horizontal position, with a divergence of about 180°. Attempts to cross-fertilise the two species produced only a few small, weak seedlings which died off without producing more than a single leaf.

R. toximontana also shows some affinity to *R. austinii*, and forms a link between the Ciliatae and the Tortuosae. It is readily distinguished from the latter species by its generally elongating stem, white flowers, filaments not widened at their bases, and greener bract and bracteole.

Variation occurs in the size of the basal ridge of the corm. This is sometimes not very much wider than the corm itself.

The name of the species is derived from its type locality.

13. **R. tabularis** Béguinot, Bot. Jb. 38: 337 (1907a), et 1907b p. 113 et p. 476 et 1909 p. 104; de Vos 1965 p. 138 et p. 148; ?Ecklon 1827 p. 18 nom. nud., sec. Béguinot.

R. bulbocodioides Ecklon 1827 p. 19 nom. nud. excl. syn.: non Baker nec Klatt nec Delar. sub Ixia.

R. versicolor Béguinot 1909 p. 116 excl. syn. *R. duthieae* L. Bolus 1928 p. 342 —type: *Duthie 1927* (STE) and s.n. (BOL); Lewis 1950 p. 221. *R. rosea* Eckl. var. *parviflora* Baker 1892 p. 104 pro parte et 1896 p. 42 pro parte—type: Herb. Drège sub *Trichonema recurvum b* (K pro parte).

Icones: S. Afr. Gdng. Country Life 18: 341 (1928); Kidd 1950 t.42,6 sub *R. duthieae* L. Bol.; this work Fig. 10, 23.

Plants 10—35 cm or up to 60 cm tall. *Corm* 5—10 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, often splitting into fine parallel fibrils on the basal ridge, and apical fibres 3—5 mm long. *Stem* 1—20 cm or up to 30 cm long, usually extending above-ground, erect. *Basal sheaths* 2, rarely 1, 10—70 mm long. *Basal leaves* 1 or 2 or seemingly more in short-stemmed forms, filiform, subterete or compressed cylindrical, 10—35 cm or up to 60 cm long, 1—2 mm diam., suberect or curved, grooves narrow, sheathing leaf bases 2—5 mm wide; *cauline leaves*

shorter than the basal, with wider leaf sheaths. *Peduncles* 10—50 mm or up to 80 mm long, semiterete, suberect or bent. *Bract* green, sometimes with very narrow, hardly visible membranous margins, more or less narrowly ovate, 8—16 mm long, subobtuse to acute. *Bracteole* sometimes slightly shorter than the bract, reddish or greenish in the centre, with wide brown-dotted or brown-edged membranous margins narrowing to a reddish or greenish tip. *Flowers* 2—4 or more, 15—35 mm long. *Perigone tube* 3—5 mm long, funnel-shaped; *segments* narrowly elliptical, 10—28 mm long, 3—7 mm wide, obtuse to subacute, lavender-blue (RHS 91A, B, 92B, C) or sometimes white or cream or bluish-violet (RHS 87B) in the upper half, cup and lower half of segments orange or golden-yellow, often with a pale transverse band in the throat, outer segments with irregular green and brown markings on the backs or sometimes greenish or purplish. *Stamens* erect, inserted near base of perigone tube, yellow; *filaments*, 3—6 mm long, minutely pilose in the lower half; *anthers* 3—6 mm long. *Style* 8—13 mm long; *stigmas* 1—2 mm long, reaching to the anther tips or slightly lower or up to 4 mm higher. *Capsules* shortly cylindrical, ca. 10 mm long, on strongly curved peduncles which straighten later. *Chromosome number* 2n = 24 (*de Vos 1260*, *1690*, *1888*).

Lectotype: *Ecklon & Zeyher Pr. b. Sp. 595* sub Irid. 199, *Romulea tabularis* Eckl., etc. in B.

CLANWILLIAM. Between Elandskloof and Clanwilliam: *Leipoldt 4420* (BOL). Heuningvlei: *Marloth 2658* (PRE). Otterdam: *Compton 24182* (NBG).

PIKETBERG. Between Velddrift and Aurora: *de Vos 1895*. 2—3 mls. S of Sauer: *Lewis 3567* (SAM). Soutkloof: *Barker 2681* (NBG).

HOPEFIELD. Near Hopefield: *Bolus 12836* (BOL), *Bachmann 2158* (Z). Near rocky coast, Kreeftebaai: *de Vos 2039*.

MALMESBURY. Near Darling: *Schlechter 5340* (BOL, GRA, K, Z), *Leipoldt BOL 20815*, (BOL, PRE), *Stokoe SAM 58336*. Between Mamre and Darling: *Salter 2706* (BOL, BM, K), *Salter 2694* (BOL, BM, K), *Pillans 6710* (BOL, K). *Esterluysen 18867* (BOL). Near Mamre: *Compton & Lamb NBG 1317–31* (BOL), *L. Bolus BOL 20336*. Near Groenkloof: *Bolus 4345*, *MacOwan 2498* (SAM). Between Darling and Ysterfontein: *de Vos 1690*. Between Malmesbury and Riebeeck-Kasteel: *Leipoldt 3050* (BOL, PRE). Near Klipheuwel: *de Vos 1960*.

BELLVILLE. Near Fisantekraal: *de Vos 1770*. Along Stellenbosch–Klipheuwel road: *de Vos 2175*.

CAPE. *Worsdell* ann. 1909 (K). Blouberg: *Arbuthnot BOL 20315*. Bloubergstrand: *de Vos 1888*. Eastern slopes of Table Mt. near Constantia: *Ecklon & Zeyher Pr. b. Sp. 595* sub Irid. 199 (B), *Drège Irid. 199* (Z). Green Point: *Wilms 3716* (G, partly Z). Green Point Common: *Dodd 1562* (BOL, BM). Near Sea Point: *Dod 2696* (BOL) Near Camps Bay: *MacOwan HAA 1780* partly (BOL, G, not in GRA, BM, K, etc.). Paardeneiland: *Salter 7435* (BOL, K), *Lewis 66* (SAM). Near Maitland Cemetery, *Dod 3276* (BOL, BM, K). Cape Flats: *Arbuthnot* s.n. (BOL). Duinefontein, Cape Flats: *Dod 1795* (BOL, K). Rapenberg Vlei: *Dod 3631* (BOL, BM, K). Claremont: *Schlechter 1565* (GRA). Kenilworth: *L. Bolus BOL 13943*. Kromboom Farm, Kenilworth: *Salter 6160* (BOL, K), *Salter 9677* (BM). Noordhoek flats: *Lewis 33* (SAM).

STELLENBOSCH. Stellenbosch flats: *Duthie 1927* (STE), s.n. (BOL), *de Vos 1260*, *Strey 574* (PRE). Near Kanonberg: *Acocks 1916*, *2043* (S). Bottelary: *de Vos 1284*.

PAARL. Near Paarl: *de Vos 1745*.

TULBAGH. Near Voelvlei station: *de Vos 1744*.

CALEDON–HERMANUS. Kleinmond: *de Vos 1590*. Hermanus-Stanford road: *de Vos 2142*.

BREDASDORP. Brandfontein: *Esterhuysen 19003* (BOL). Between Elim and Stanford: *de Vos 2049*.

WITHOUT LOCALITY. *Zeyher 503* (G, partly in P). *Leibold* ann. 1838 (G). *Hornemann* s.n. sub *R. rosea* (C). *Zwackher* 27.XII.1847 (M). *Penther 608* from ?Undersbergvalley (M, S, Z). Hb. Drège sub *Trichonema recurvum* Spr. b (K partly, not in other herbaria).

Flowering period July to October.

In moist, sandy or clayey localities on flats, mostly at low altitudes.

This widely distributed species is readily recognised in the veld by its generally lavender-blue flowers. The blue colouring of the perianth and the typical green and brown blotches on the backs of the outer perianth segments are rarely retained in herbarium specimens and Béguinot recorded the flower colour as rose-violet. Other features must therefore be used to distinguish herbarium specimens.

R. tabularis in the herbarium is distinguished from *R. leipoldtii*, to which it stands very close, by somewhat smaller flowers with segments generally about 5 mm in width, and by bracteoles which are slightly more membranous in their centres. Herbarium specimens of *R. tabularis* with two basal leaves are readily distinguished from *R. flava*, but those with a single basal leaf can only be distinguished by their proportionally narrower, elliptical segments and somewhat greener bracteole.

R. tabularis is variable in the following features: length of stem, number of basal foliage leaves when the stem is elongated, flower size and colour, and length of style. The upper half of the perianth segments is white in specimens at Kreeftebaai on the west coast (*de Vos 2039*), and bluish-violet between Velddrift and Aurora (*de Vos 1895*). In other localities white variants occur occasionally amongst the typical blue-flowered populations.

Specimens with stigmas overtopping the anthers were placed in a distinct species, *R. duthieae*. The two forms, with longer and shorter styles, are, however, interfertile, producing a progeny with styles intermediate in length. In some populations the two forms and intermediates occur together (de Vos 1965).

Plants with long stems usually have a single basal leaf, but in some collections the number of basal leaves varies from one to two. As specimens with two basal leaves do not differ in other respects, they have not been separated from the species.

Short-stemmed forms growing in bright sunlight, e.g. at Bloubergstrand, may be confused with *R. pratensis* or with *R. rosea* var. *australis*. But their pale blue perianth, green herbaceous bracts and the anatomical structure of the leaf indicate that they are *R. tabularis*. The short stem and spreading leaves are environmental modifications. When grown in the botanical garden at Stellenbosch, these plants acquired their usual growth form in the following season.

According to Béguinot (1907a, 1909) this species is *R. tabularis* Ecklon, a nomen nudum, whence Béguinot's name. I did not find Ecklon's original col-

lection, and those seen in S and labelled *R. tabularis* Eckl. are not of this species.

Specimens of this species were misidentified as *Trichonema speciosum* Ker by Klatt.

14. **R. leipoldtii** W. Marais, Bot. Mag. 175: 460 (1964); de Vos 1965: 138.

R. filifolia auct. non Eckl. 1827: Baker 1877 p. 88 et 1892 p. 101 et 1896 p. 38; Klatt 1882 p. 402 et 1895 p. 164; Béguinot 1907b p. 113 et p. 475 pro parte et 1909 p. 101 excl. syn. *R. tubata & R. schlechteriana:* non *Ixia filifolia* Red. 1809 nec Poir. 1813.

Trichonema filifolium auct. non Ker 1827: Klatt 1865–1866 p. 671 excl. syn. Eckl.

Icon: Bot. Mag. 175 t. 460 (1964).

Plants 15—30 cm or to 60 cm tall. *Corm* 7—15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with fine parallel fibrils up to 2 mm long on the basal ridge, and apical fibres ca. 5 mm long. *Stem* 5—25 cm or up to 35 cm long, extending aboveground, erect. *Basal sheaths* 1—2, 10—60 mm long. *Basal leaves* usually 2, filiform, 15—60 cm long, ca. 1 mm diam., erect or bent, grooves narrow, sheathing leaf bases up to 4 mm wide; *cauline leaves* 2 or more, shorter than the basal leaves, leaf sheaths up to 8 mm wide. *Peduncles* 25—70 mm long, semiterete, suberect or bent. *Bract* green with very narrow, hardly visible membranous margins, more or less narrowly triangular, 12—18 mm long, obtuse or acute. *Bracteole* green or greenish in the centre, with wide brown-spotted or brown-edged or almost colourless membranous margins, tip green or reddish, obtuse or emarginate. *Flowers* 4—6 or more, 25—40 mm long. *Perigone tube* 4—8 mm long, funnel-shaped; *segments* narrowly elliptical or narrowly obovate-elliptical, 18—35 mm long, 5—8 mm wide, reflexed in the open flower, subacute to obtuse, golden-yellow or orange in the lower half and cup, cream or white with yellow veins in the upper half, outer segments sometimes fawn or greenish on the backs. *Stamens* erect, inserted in the lower half of the perigone tube, golden-yellow; *filaments* 5—8 mm long, pilose in the lower half or sometimes almost to their tops; *anthers* 5—8 mm long. *Style* 12—20 mm long; *stigmas* ca. 2 mm long, overtopping the anthers or sometimes just reaching the anther tips. *Capsules* shortly cylindrical, ca. 10 mm long, on arcuate peduncles which straighten later. *Chromosome number* 2n = 24 (*de Vos 1896*).

Holotype: *Leipoldt* s.n. (from Warmbaths) in K.

CALVINIA. Between Oorlogskloof and Papkuilsfontein: *Leipoldt 3052* (BOL, PRE, B). CLANWILLIAM. *Mader* sub *MacOwan 2171* (K). Kloof near dam: *Lewis 1852* (NBG). Warmbaths: *Leipoldt* s.n. (K), *Leipoldt BOL 20487* (BOL, SAM). Pakhuis: *MacOwan SAM 20725*. Bidouw Valley: *Lewis 2668*, *Middlemost 1749* (NBG). Nardouw Kloof: *Stokoe SAM 59783*. Foot of Pakhuis Pass: *de Vos 1466*. Sandveld between Grey's Pass and Graafwater: *Leipoldt 3541* (PRE). Near Graafwater: *Acocks 19781* (PRE, K, M). Kransvlei Kloof vlei:

Barker 4763 (NBG). 5 mls. from Clanwilliam on road to Kransvlei: *Gillett 4029* (BOL). Knolvlei: *Taylor 5937* (PRE). Near Citrusdal: *Compton NBG 2008/36, Barker 3077* (NBG). Paleisheuwel: *Taylor 5948 partly* (STE). Between Paleisheuwel and Leipoldtville: *Werdermann & Oberdieck 456* (PRE, K). Between Leipoldtville and Elandsbaai: *de Vos 1896*. Olifantsrivier, locality 76: ?*Ecklon & Zeyher* s.n. (GRA, B, C, P, S), *Ecklon & Zeyher Irid. 204* (LD, P, S, Z), *Zeyher 1069* (S). Olifants River valley: *Leipoldt SAM 54094*. On banks of Olifants River and at Villa Brakfontein (76.10), sub *Trichonema filifolium* Eckl. (PRE, S, Z).

PIKETBERG. Antonies River: *Leighton 93* (BOL, PRE). N.E. margin of Verlorevlei near Redelinghuys: *Pillans 7804* (BOL). Berg River valley near Skrik van Rondom: *Acocks 2190* (S). Het Kruis: *Zinn SAM 52918, Strey 17M*. Het Kruis vlei: *Compton 15030* (BOL, NBG, STE). Near Porterville: *de Vos 1464*. Papkuil valley: *Bond 551* (NBG).

MALMESBURY. Flats S. of Mamre: *Salter 3573* (BOL). Klipheuwel: *Loubser 451* (NBG).

A sheet of *Zeyher s.n.* in K has a locality label of Uitenhage on it, which made Baker (1892, 1896) record Uitenhage as locality for the species. This is most probably not correct. (In K another collection of *Zeyher* was found with *R. longipes* in it and a locality record of Clanwilliam. The locality labels of these specimens were probably interchanged.)

Flowering period September to October.

In damp sandy localities.

The incorrect naming of this species by Klatt (1865–66) as *Trichonema filifolium* Eckl. led to a number of errors which were put right by W. Marais (1964). Some botanists had already noticed the error, as a note, "*R. filifolia* Baker, not of Ecklon", written on one of Zeyher's collections of this species in K, testifies. *R. filifolia* Bkr. is a later homonym of *R. filifolia* Eckl., which is a synonym of *R. triflora* (Burm. f.) N.E. Br. This left the present species without a name, which Marais then supplied. He based his description on a new type, but included under the synonymy *Trichonema filifolium* Eckl. ex Klatt. This tied his species to the type of the latter name, which is Redoute's figure of *Ixia filifolia* (1809), a different species altogether. In the present investigation it was confirmed that *T. filifolium* sensu Klatt (1866), but with the synonyms excluded, is *R. leipoldtii*—the collection cited by Klatt, namely *Ecklon & Zeyher Irid. 204*, from the Olifants River and Brakfontein in the Clanwilliam district, belongs to this species.

The species can be readily identified by its characteristic flower colouring, (yellow in the lower *half* of the perianth segments and cream in the upper), its narrow, more elliptic segments, and by its corm of the ciliata type. Its corm distinguishes it from the sympatric *R. obscura* var. *campestris* with which it has occasionally been confused. The features of its corm and flowers show that it is not closely allied to *R. triflora*, as Marais suggested.

It stands very close to *R. tabularis*, differing only in flower colour, slightly larger flower size, and generally a somewhat later flowering period. It is impossible to distinguish specimens in which the colour of the flowers has faded, e.g. *Arbutlnot BOL 18719*. Both species occur from Clanwilliam to Malmesbury, with *R. tabularis* also spreading farther towards the south.

Variation occurs in the relative length of the anthers and filaments. Mostly

the anthers and filaments are about equal in length, but in some specimens the filaments are longer than the anthers and in others the anthers are the longer. Baker (1896) recorded the latter condition.

The plants figured in the Bot. Mag. 175 t. 460 are not typical. In their natural habitat the stems are stronger and erect and the peduncles more erect in the flowering stage.

15. **R. flava** (Lam.) De Vos, Jl S. Afr. Bot. 36: 273 (1970); Goldblatt & Barnard ibid. p. 306.

Ixia flava Lam. Illustr. 1: 109 (1791).

Plants 10—55 cm tall. *Corm* 6—15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown or light brown, with fine parallel fibrils on the basal ridge, and apical fibres ca. 5 mm long. *Stem* short, hidden by sheathing leaf bases, or up to 30 cm long and extending above-ground, erect. *Basal sheaths* 2 or 1, 5—80 mm long. *Basal leaf* 1 or seemingly more in short-stemmed forms, filiform, subterete or compressed cylindrical, suberect or bent and spreading, 10—55 cm long, 0,8—3 mm diam. or sometimes wider, glabrous or minutely ciliate on the rib margins, grooves wide or narrow, sheathing leaf bases up to 6 mm wide; *cauline leaves* 2—3, usually shorter and with wider leaf sheaths, the highest leaf consisting of a leaf sheath only. *Peduncles* 15—70 mm long or up to 100 mm, semiterete, glabrous or minutely ciliate on the two sharp angles, suberect. *Bract* green, often with very narrow membranous margins, narrowly ovate-triangular, 8—20 mm long or up to 28 mm, obtuse to subacute or rarely emarginate, with closely spaced veins. *Bracteole* membranous or sometimes submembranous in the centre, brown or brown-streaked especially in the upper half, obtuse to acute. *Flowers* 1—4 or more, 20—40 mm long or rarely smaller or larger. *Perigone tube* 3—7 mm long, funnel-shaped; *segments* narrowly obovate, 10—30 mm long, 3—12 mm wide, acute to subobtuse, rarely emarginate, sulphur-yellow (RHS 6A), pale yellow or white, or sometimes blue, blue-violet or rarely pink, with a golden-yellow or greenish-yellow cup and throat, often with three dark lines in the throat, outer segments frequently green or greenish-brown on the backs. *Stamens* erect, inserted near the base of the perigone tube, hardly reaching halfway up the perigone; *filaments* 4—7 mm long, pilose at the base; *anthers* 3—7 mm long, golden to orange-yellow. *Style* 8—15 mm long; *stigmas* reaching to the anther tips or sometimes slightly lower or higher. *Capsules* shortly cylindrical, ca. 10 mm long, on recurved peduncles which straighten when drying.

Type: sub *Ixia flava* in Lamarck's Herbarium in P. Under *I. flava* Lam. in this herbarium are two sheets of nineteenth century paper, each with a label "Herbier de Lamarck aquis en Novembre 1886" and each with a single

specimen of this species: the one has a short stem and arcuate leaves, and the other an elongated stem but no corm and is probably a cultivated specimen. The latter sheet bears an old label, "*ixia flava* lam. gen." in Lamarck's handwriting, which was probably cut out of the original sheet and pasted on the present sheet. The former specimen, still mounted on a small scrap of its original mounting paper, bears a small label, "ixia", across the plant, which is not in either Lamarck's or Thunberg's handwriting. There is no reason to believe that either of these specimens originally accompanied Lamarck's label. But as these specimens are in his herbarium and fit his description of *Ixia flava* (1791), one of them should be chosen as lectotype. The short-stemmed plant, although somewhat insect eaten, is chosen as lectotype, as this is probably from an original Cape collection and is a more complete specimen than the other which has lost its corm.

Until quite recently this species has been commonly known as *R. bulbocodioides* (De la R.) Bkr. However, the detailed description of the corm of *Ixia bulbocodioides* Delar. (1766 p. 19: "Bulbus . . . contectus squamis nonnullis campani-formibus. . . . Pars inferior bulbi obtegitur etiam squama dura orbiculari ciliata"), shows clearly that *I. bulbocodioides* Delar. is not the same as the present species. This name for the present species is therefore a misapplication. The next oldest name for the species is *I. flava* Lam., and its name has therefore been changed to *R. flava* (Lam.) comb. nov.

This very common, widely distributed, polymorphic species is readily recognised by its green bracts and membranous, or occasionally submembranous bracteoles, its corm with a crescent-shaped, ciliate basal ridge, and, in long-stemmed forms, by its single basal foliage leaf.

Wide variation occurs in growth form and flower colour. Short-stemmed forms with broad, somewhat inflated, arcuate and spreading, leaves, to long-stemmed forms with narrow erect leaves, occur. A minute ciliation on the margins of the leaf ribs, visible only with the aid of a lens, occurs occasionally. The perianth varies from yellow to pale yellow or white, or is sometimes blue or violet-blue, or rarely pink.

Some of the variations, e.g. flower colour, are controlled genetically. According to Schutte (1949) the yellow and white flower colours are controlled by two pairs of factors, the yellow and white types being homozygous, and the pale yellow heterozygous. The white-flowered forms were named *R. latifolia* Bkr., but Béguinot (1908a) already realised that they and the yellow forms belonged to the same species, and he placed the white types with *R. bulbocodioides* as var. *latifolia*.

According to Schutte (l.c. p. 100) the size of the plants appears to be genetically determined. Transplant experiments in Stellenbosch have shown that the environment also influences stem elongation: plants cultivated in partial

shade amongst tall vegetation, have longer stems and more erect leaves than when grown in the open.

Many of the variants have been described as separate species. As considerable numbers of intermediates connecting the variants have been found, it has been decided to include all the variations in a single, polymorphic species.

Béguinot also recognised the wide variation within this species. He gave seven varieties (1909 pp. 109–110), four of which cannot be upheld: var. *latifolia* is the white-flowered form of the typical variety (see above); var. *elongata* is a growth form of the typical variety with a long stem; under var. *prostrata* Béguinot cited no specimens and this name is therefore dubious; his type specimen and only citation of var. *ambigua* is a variety of *R. hirsuta*.

KEY TO THE VARIETIES

1 Leaves glabrous; flowers yellow or white, sometimes blue.
 2 Flowers 25 mm long or longer, yellow to white, sometimes blue . . . a. Var. *flava*
 2 Flowers less than 25 mm long, yellow b. Var. *minor*
1 Leaves usually minutely ciliolate on rib margins; flowers not yellow.
 3 Stem short, hidden by leaf bases; leaves 2—3 mm diam., somewhat inflated, cross-shaped in transverse section, usually curved d. Var. *hirsuta*
 3 Stem frequently elongated, rarely short; leaves ca. 1 mm diam., suberect or sometimes bent c. Var. *viridiflora*

a. Var. **flava**

R. flava (Lam.) De Vos 1970c p. 273; Goldblatt & Barnard 1970 p. 306. *Ixia flava* Lamarck 1791 p. 109; type: Hb. Lamarck (P): non *I. flava* Hornem. *I. bulbocodium* Thunberg 1783 p. 6 pro parte et 1823 p. 55 pro parte: non Linn. *I. recurva* F. De la Roche 1809 t. 251 fig. 1. *I. recurvifolia* Poiret 1813 p. 201; Roemer & Schultes 1817 p. 375. *I. reflexa* Thunberg 1811 p. 220 et 1823 p. 55; Juel 1918 p. 113: non Andr. 1798. *I. pudica* Soland. nom. nud. in Hb. Banks.: non Roem. & Schult. 1817.

Trichonema pudicum Ker 1805 p. 223 nom. nud.: non Ker 1810 et 1827, nec Steudel 1841 nec Klatt 1865–66. *T. recurvum* Sprengel 1825 p. 149; Ker 1827 p. 83. *T. recurvifolium* Ker 1827 p. 83. *T. caulescens* Ker 1827 p. 82 excl. syn. *I. bulbocodioides* De la R.; Klatt 1865–66 p. 663 excl. syns. except *R. fragrans* Eckl. *T. reflexum* (Thunb.) Steudel 1841 p. 702 pro parte, excl. syn. Eckl. *T. latifolium* Herb. ex Baker 1876 p. 237 pro syn.

R. chloroleuca sensu Ecklon 1827 p. 20 nom. nud. excl. syn.: non Bkr. 1877. *R. fragrans* sensu Ecklon 1827 p. 19 nom. nud., excl. syn. *R. recurva* Eckl. 1827 p. 20. *R. ?candida* Tenore 1845 p. 95. *R. latifolia* Baker 1876 p. 237 et 1877 p. 89 et 1892 p. 101 et 1896 p. 39—type: icon Herbert; Klatt 1882 p. 400 et 1895 p. 165. *R. bulbocodioides* Baker 1877 p. 88 pro parte et 1892 p. 101 et 1896 p. 37, excl. syn. *Ixia bulbocodioides* De la R.; Klatt 1882 p. 402 et 1895 p. 162 excl. syn. De la R; Béguinot 1907b p. 114 et p. 476 et 1908a p. 162 pro parte et 1909 p. 108 excl. syn. De la R.; Lewis 1950 p. 221: non Eckl. 1827. *R. bulbocodioides*

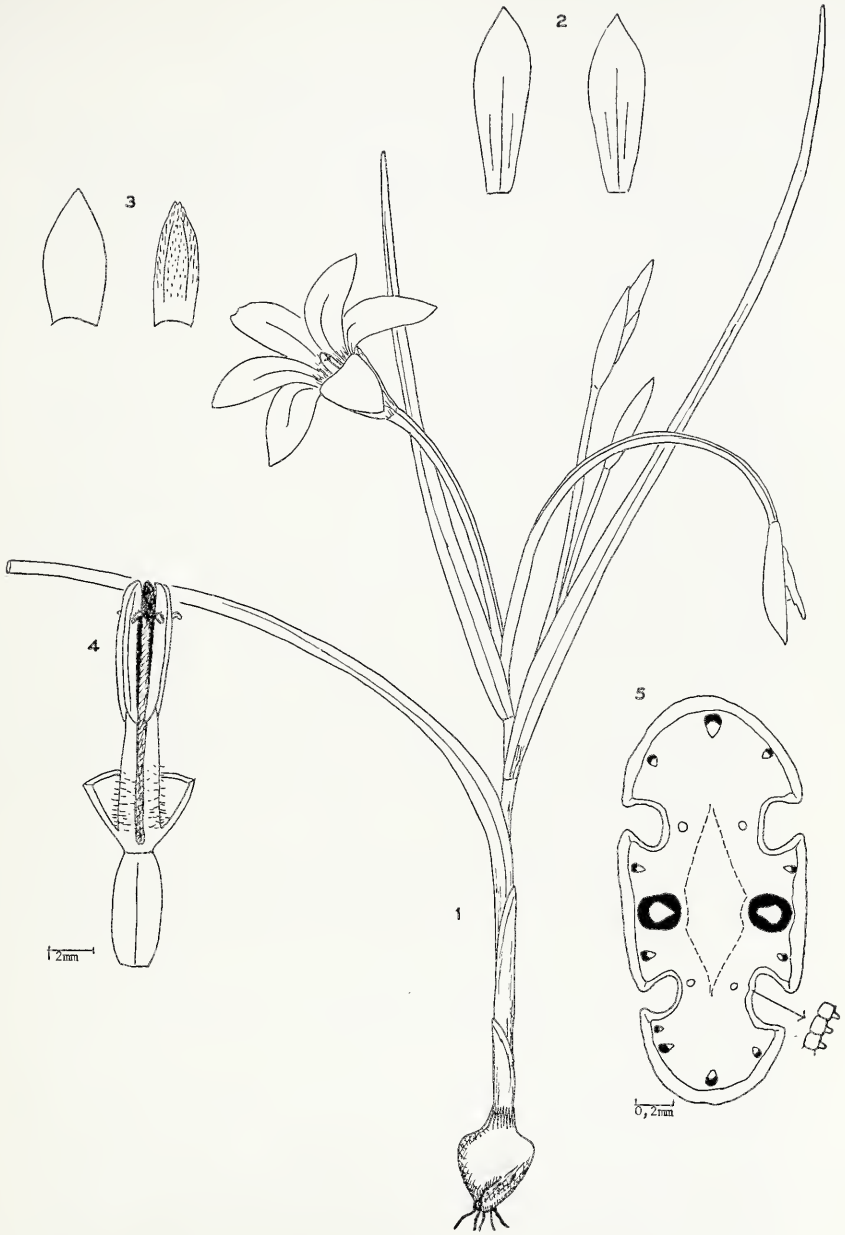


FIG. 24.

R. flava (*de Vos* no. *1090*). 1, plant $\times\frac{1}{6}$. 2, perianth segments, upper surface. 3, bract and bracteole $\times 1$. 4, pistil, stamens, and perianth tube. 5, transverse section of leaf.

var. *latifolia* (Bkr.) Béguinot 1908a p. 163 et 1909 p. 109. *R. bulbocodioides* var. *elongata* Baker 1896 p. 38; Béguinot 1909 p. 110. *R. caulescens* Klatt 1882 p. 399 et 1895 p. 163. *R. bachmannii* Béguinot 1908a p. 161—type: *Schlechter 7970* (G holo; BOL, BM, Z, etc.)—et 1907b p. 113 et p. 476 et 1909 p. 103, excl. var.

Bulbocodium latifolium (Bkr.) Kuntze 1891 p. 700. *B. flavum* (Lam.) Kuntze l.c.

Ixia crateroides in P (*Sieber* 1826), non Ker 1802. *Trichonema chloroleucum* Ker a, in herb., non Ker 1827 nec Jacq. sub Ixia.

Icones: Redouté 1809 t. 251 fig. 1; Rice & Compton 1950 Pl. 189 fig. 1; Kidd 1950 Pl. 26 fig. 3 et Pl. 35 fig. 3; Herbert MS in Lindley Library sub *T. latifolium;* Dietrich 1831 t. 7; this work Fig. 24.

Stem short and hidden or up to 30 cm long. *Basal leaf* 1 or seemingly more in short-stemmed forms, glabrous, 1—3 mm diam. or rarely wider, grooves often wide. *Bract and bracteole* 12 mm or more in length, the bracteole membranous, often narrower than the bract. *Flowers* 25 mm or more in length. *Perigone tube* 4—7 mm long; *segments* 15 mm or more long, 6 mm or more wide, sulphur-yellow, cream or white or rarely blue, with 3—5 slender dark veins in the throat, cup yellow. *Filaments* 5—7 mm long: *anthers* 4—7 mm long. *Style* 10—15 mm long. *Chromosome number* 2n = 24 (*de Vos 1740*).

CLANWILLIAM. Modderfontein: *Schlechter 7970* (BOL, GRA, PRE, NU, BM, K, G, P, S, etc.). Grey's Pass: *Leipoldt* s.n. (BOL, PRE). Warm Baths: *Leipoldt BOL 21509* (PRE), SAM 52400; *Bolus 13326* (BOL). N. of Citrusdal; *Salter 6107* (SAM). Brandewyn River: *Compton 7695* (NBG).

PIKETBERG. De Hoek: *Compton 10907* (NBG). Het Kruis Road: *Barker 6360* (NBG).

VREDENBURG. *de Vos 2228*.

HOPEFIELD. Near Hopefield: *Bachmann 1576* partly (B), *2016* (Z). Donkergat: *Hall 3199* (NBG).

MALMESBURY. *Bachmann 646* (B). Riebeeckkasteel, Bothma's Pass: *Salter 2657* (BOL). Waterkloof near Mamre: *de Vos 1820*. Darling: *Bachmann 627* (Z). Between Darling and Ysterfontein: *Martin 1211* (NBG). Philadelphia sand-dunes: *Wasserfall* 203 (NBG).

CERES. *Rogers 28747* (Z). Prince Alfred's Hamlet: *Salter 2623* (BOL, K). In the plains: *Marloth 12202* (PRE). Top of Gydouw Pass: *Salter 2625* (BOL). Leeurivier: *Lewis SAM 57970*. Between Gydouw Pass and Hotnotskloof: *de Vos 1272*. N. foot of Matroosberg: *Esterhuysen 18711* (BOL, PRE, STE).

TULBAGH. Tulbagh Kloof: *Ross-Frames BOL 21275*. Saron: *Schlechter 7866* (BOL, GRA, PRE, NU, G, K), *Andrag STE 19781*. Near Roodesandkloof: *Burchell 986* (K). Wolseley, Breede River valley: *Marloth 9083* (PRE).

CAPE. Near Cape Town: *Bolus 2810* (BOL, SAM, K), *MacOwan 2573* (S). Sea Point: *Dod 1159* (K), *Bolus 3696* (BOL, K). Juxta vias pr. Sea Point: *Schlechter 1055* (GRA, C, G, Z). Slopes above Sea Point: *Phillips SAM 3832*. Foot of Devil's Peak: *Zeyher 2573* (K). Table Mountain: *Ecklon U.J. 704* (PRE, K, M, S), *705* (S). Near Platteklip: *Marloth 10594* (PRE). In clivis montis Leonis: *Schlechter 1052* (GRA). Kloofnek: *Marloth 5351* (PRE). Milnerton: *Barker 2346* (NBG). Hout Bay Nek: *Acocks 4457* (S). Mowbray: *Wilms 3730* (G). Cape Flats: *Rehmann 1836* (BM), *1838*, *1871* (Z). Rosebank: *Bolus 3734* (BOL, partly in K). Camp ground: *Dod 563* (BM), *2759* (BOL, K). Claremont Flats: *Dod 1264* (K), *1300* (BM). Kenilworth: *Salter 998* (K) *de Vos 1267*. Kenilworth Race Course: *Pearson 151* (G). Between Cape Town and Simons Bay: *Burchell 8533* (K). Cape Flats near Wynberg: *Schlechter 758* (P, US, Z). Noordhoek: *Andreae 577* (PRE). Slangkop Mts.: *Compton 13241* (NBG). Muizenberg Vlei: *Dod 2570* (BOL, BM, K). Redhill: *Compton 18002* (NBG). Neighbourhood

of Simonstown: *Marloth 112* (PRE). Cook's Bay: *Humbert 9543* (PRE). Bright Water: *Compton 17087* (NBG). Near Smith's farm: *Salter 4645* (BOL, BM, K).

BELLVILLE. Peaslake: *Taylor 4952* (PRE). Modderdam: *Steyn 75* (NBG). Kuilsrivier in arenosis dunarum: *Zeyher SAM 20705*.

PAARL. Berg River near Paarl: *Drège* sub *T. chloroleucum a* (K). Franschhoek Mts.: *Marloth 65* (PRE). Near Simondium: *Acocks 4480*, *4481* (S). Klapmuts: *Acocks 2708* (S).

WELLINGTON. *Grant 2364* (BM).

STELLENBOSCH. *Garside 281*, *Galpin 4658* (PRE). Beside Bottelary road: *Acocks 4464* (S). Stellenbosch flats: *Duthie 509*, *de Vos 1090*. Jonkershoek: *Parker 4586* (PRE). Swartboskloof: *Van der Merwe 1117* (PRE). Kanonkop: *Lorenzo STE 30190*.

SOMERSET WEST—STRAND. Somerset West: *Parker 4215* (BOL). Hottentots Holland: *Verreaux* s.n. (G), *Wall 3* (S). Sir Lowry's Pass: *Schlechter 1158* (GRA, G, K). Gordon's Bay: *Loseby* s.n. (STE).

CALEDON—HERMANUS. Houw Hoek Mts.: *Zeyher 4046* (BOL, SAM, PRE). Bot River: *MacOwan H.N.A.A. 256* (BOL, SAM, K, partly in G, S). Near Caledon Baths: *Purcell SAM 46255*. Palmiet River mouth: *Davis SAM 60103*. Kleinmond: *de Vos 1740*. Betty's Bay: *de Vos 2008*. Hermanus: *L. Bolus 19205*, *Salter 1191* (BOL).

SWELLENDAM. Bontebok Park: *Acocks 22239* (PRE), *Marais 72* (STE). Base of Langeberg near Swellendam: *Wurts 248* (NBG). Below 10 o'clock Mts.: *Wurts 275*.

RIVERSDALE. Railway embankment: *Muir 4875* (K). Botteliersfontein: *Muir 958* partly (BOL, not in PRE).

WITHOUT LOCALITY. *Burmann* sub *Ixia recurvifolia* Delar., etc. (G). *Oldenburg 280*, *281* (BM). *Masson* sub *R. rosea* var. *latifolia* (BM). *Hb. Ecklon 705* (S). *Ecklon & Zeyher 203* (SAM 20684 partly). *Zeyher PRE 21926*. *Drège Irid. 202* (G). *Drège* sub *T. chloroleucum* Ker a (K). *Rogers 1/80* (K). *Niven* sub *R. vulgaris* (K). *Schlechtendal* (G). *Sieber, Fl. Cap. 234* (G, P). *Bowie* s.n. (BM). *Thunberg* ann. 1774, 1775 sub *R. reflexum* Steud. (S). *Osbeck* ann. 1750–52 (S). *Sparmann* ann. 1772 vel 1765–67 (S partly). *Prior* sub *Ixia crocea* (PRE, K, Z).

Variation occurs within the typical variety. Long or short-stemmed specimens with wide or narrow, bent or upright leaves, and large yellow or white flowers, all belong to this variety.

Some collections, e.g. of *Ross-Frames* (BOL 21275) and of *Lorenzo* (STE 30190), have the upper unifacial part of the leaf reduced and the bifacial leaf sheath abnormally well developed and up to 100 mm in length and almost 10 mm wide.

Béguinot described Schlechter's specimens no. *7970* as *R. bachmannii*, suggesting that they might be hybrids between *R. bulbocodioides* and *R. filifolia*. There does not seem to be any justification for this opinion, as the specimens fit well into the polymorphic var. *flava*.

b. Var. **minor** (Beg.) De Vos comb. nov.

R. bulbocodioides Bkr. var. *minor* Béguinot, Annu. Conserv. Jard. Bot. Genève 11—12: 163 (1908), et 1909 p. 110—syntypes: *Schlechter 8396*, *8782* (G, etc.).

Trichonema caulescens Ker 1811 t. 1392 et 1827 p. 82 excl. syn. De la R.—type: icon Bot. Mag. t. 1392. *T. hypoxidiflorum* Salisb. 1812 p. 316—type: icon Bot. Mag. t. 1392.

Icon: Bot. Mag. t. 1392 (1811) sub *T. caulescens*.

Stem short and hidden or elongated and extending above-ground. *Basal leaf* 1 or seemingly more in short-stemmed forms, glabrous, 1—3 mm wide. *Bract* 8—12 mm long. *Bracteole* frequently slightly longer than the bract, membranous.

Flowers less than 25 mm long. *Perigone tube* 3—4 mm long; *segments* 10—15 mm long, 3—4 mm wide, sulphur-yellow. *Filaments* 4—5 mm long; *anthers* 3—4 mm long. *Style* 8—9 mm long. *Chromosome number* 2n = 24 (*de Vos 1764, 1973, 1923*).

Lectotype: *Schlechter 8396* in G. Isotypes in GRA, PRE, BM, K, P, S, etc.

VANRHYNSDORP. Foot of Matzikamma: *de Vos 1992*. Gifberg: *de Vos 2021*. Past Koebee: *de Vos 2107*.

CALVINIA: Between Grasberg and Niewoudtville: *Lewis 5845* (NBG). On edge of Bokkeveldberg plateau: *de Vos 1985*.

CLANWILLIAM. *Fock NBG 1504/25* partly. Langekloof: *Schlechter 8396*. Koudeberg: *Schlechter 8782* (PRE, GRA, BM, G, K, P). Pakhuis Pass: *de Vos 1923*. Between Citrusdal and Elandsfontein: *de Vos 1618*. Olifants River valley, 20 mls. S of Clanwilliam: *de Vos 1467*. Road to Paleisheuwel: *de Vos 1994*. Cedarberg: *Stokoe SAM 63695*. Sandkloof, Cedarberg: *de Vos 2043*.

PIKETBERG. Martin Melck's farm, Berg River: *Barker 4051* (NBG).

CAPE. Wet places near Green Point: *?Ecklon* s.n. sub *R. bulbocodioides* Eckl. (partly S, not in B). Cape Town: *Rehmann 1437, 1439* (Z). Mowbray: *Ottley 11506* (PRE). Kirstenbosch: *Guthrie* Aug. 1926 (BOL). Cape Flats: *Rehm* s.n. (M).

BELLVILLE. Fisantekraal: *Van Niekerk 267* (BOL).

STELLENBOSCH. Stellenbosch Flats: *Duthie 1541, de Vos 1764*. Near suspension bridge: *Duthie 541* (STE). W. of Kanonkop: *Acocks 1915* (S).

PAARL. Klapmuts rugby field: *de Vos 1270*. Summit of Franschhoek Pass: *de Vos 1777*.

WORCESTER. *Bayliss 1644* (PRE). Orchard: *Esterhuysen 10287* (BOL, PRE). Bainskloof: *Salter 6822* (BOL, SAM).

CERES. Leeu River: *Compton 17361* (BOL), *Lewis 1401* (SAM). Mitchell's Pass: *Gillett 353* (BOL).

MONTAGU. Sandvlei, 14 mls. S of Matroosberg station: *de Vos 2104*.

CALEDON. *Zeyher 4046* (partly in K and P, not in BOL, PRE, SAM). *Purcell SAM 46254*. Swartberg near Baths: *Ecklon & Zeyher Irid. 203* partly (G). Between Sir Lowry's Pass and Palmiet River: *Ecklon & Zeyher 201* (S). Kleinmond: *de Vos 1264*.

SWELLENDAM. Bontebok Park: *Marais 77* partly (STE). One ml. W of Swellendam: *de Vos 1973*.

RIVERSDALE. Albertinia commonage: *Muir 1022* (BOL).

HUMANSDORP. *Rogers 2957* (BOL, GRA).

WITHOUT LOCALITY. *Drège Irid. 203* (G). *Rehmann* ann. 1871 (Z). Ex hb. Gub. sub *Trichonema recurva* (GRA).

c. Var. **viridiflora** (Bég.) De Vos comb. nov.

R. bulbocodioides Bkr. var. *viridiflora* Béguinot, Malpighia 23: 110 (1909) et 1907b p. 477—syntypes *Bachmann 1856, 1845* (B, Z).

Ixia bulbocodium Thunberg 1783 p. 6 et p. 22 pro parte et 1823 p. 55 pro parte: non Linn.

Trichonema arenarium Steudel 1841 p. 702 nom. nud.; Klatt 1865–66 p. 667 excl. syn. *R. ramosa. T. simile* Steudel 1841 p. 702.

R. arenaria Ecklon 1827 p. 18 nom. nud.; Baker 1877 p. 89 et 1892 p. 104 et 1896 p. 43 excl. syn. *R. ramosa* Eckl.; Klatt 1882 p. 402 et 1895 p. 162 excl. syn. *R. ramosa;* Béguinot 1907b p. 116 et p. 478 et 1909 p. 114 excl. syn. *R. ramosa & T. ramosum. R. similis* Eckl. ex Baker 1892 p. 102 excl. syn.—syntypes: *Oldenburg 453* sub *Ixia pumila* Soland. (BM), et *Thunberg* sub *I. bulbocodium* α (UPS)—et 1896 p. 40 excl. syn., et 1877 p. 89 nom. nud.; Ecklon 1827 p. 19 nom. nud.; Klatt 1895 p. 166; Béguinot 1909 p. 78 excl. syn. Klatt

& Eckl. *R. versicolor* Béguinot 1907b p. 116 et p. 478 et 1909 p. 116 excl. cit. *Penther 608 & Schlechter 5340.*

Bulbocodium arenarium (Eckl.) Kuntze 1891: 700. *B. simile* (Eckl.) Kuntze p. 701.

Stem frequently elongated and extending above-ground. *Basal leaf* ca. 1 mm diam., usually suberect or sometimes bent, usually minutely ciliate on the rib margins, grooves narrow. *Bracteole* membranous or submembranous, sometimes somewhat green in the centre, with wide, brown or brown-streaked membranous margins, sometimes slightly longer than the bract. *Flowers* 20—40 mm long or sometimes smaller, cup yellow, segments blue or white. *Chromosome number* 2n = 48 (*de Vos 2133*).

Lectotype: *Bachmann 1856* in B. Isotype in Z.

NAMAQUALAND. Garies district: *Salter 2556* (BOL).
CLANWILLIAM. Warm Baths: *Edwards BOL 14426.*
HOPEFIELD. Near Hopefield: *Bachmann 1845, 1856.* Between Hopefield and Paternoster: *Leipoldt 3829* (BOL). Langebaan: *Thompson 98* (STE).
MALMESBURY. Near Soutpan NE of Ysterfontein: *de Vos 2038.* Darling Flora Reserve: *Winkler 99* (NBG). Zonquasfontein farm, W of Darling: *Boucher 73* (STE).
CAPE. Van Kamps Baai: *Ecklon* Juli 1–26 (S). Pr. B. Sp.: *Ecklon* sub *R. similis* (OXF). Sanddunes near Milnerton: *Moss & Arno* s.n. (K). Slopes of Lion's Head: *Salter SAM 52452.* Rosebank: *H. Bolus 3734A* (BOL), *3734* partly sub *R. similis* (K). Camp Ground: *Dod 565* (BOL, K). Cape Flats: *Rogers 1556* (Z). Claremont Flats: *Dod 1256* (BOL, K). Doornhoogte, Cape Flats: *Ecklon & Zeyher Irid 200* (*PRE 22351*, K, G, B). Rapenburg Golf Links: *Salter 8187* (BOL, SAM). Flats near Wynberg: *Ecklon* Juli 17–25 (S). Muizenberg Mts.: *Arbuthnot* June 1916 (BOL). Rietvallei: *Zeyher SAM 20722.*
CALEDON, HERMANUS. Witvoetskloof near Stanford: *de Vos 2133.*
WITHOUT LOCALITY. Hb. Thunberg sub *Ixia bulbocodium* (UPS). Hb. Drège sub *R. versicolor* (B). *Zeyher 1606* partly (GRA, G, K, P, S, Z). *Oldenburg 453* sub *Ixia pumila* Soland. and *R. similis* Eckl, in Hb. Banks (BM). *Moss & Arno* 1925 (K).

Flowering period June to August.

This variety stands close to the white-flowered form of the typical variety, but differs in its narrow, mostly upright, usually ciliate leaf, ciliate peduncle, and often blue flowers. The following specimens are intermediate: *MacOwan 255* (BOL, K, G), *Leighton 1084* (BOL, PRE), *de Vos 1778* (STE), and possibly also *Thunberg* sub *Trichonema ochroleucum* Ker, (S). They possess narrow, upright or sometimes bent leaves, and white, or occasionally blue or rose-coloured flowers.

d. Var. **hirsuta** (Beg.) De Vos comb. nov.

R. cruciata Beg. var. *hirsuta* Beg. Annu. Conserv. Jard. bot. Genève 11–12: 158 (1908a)—holotype: *Verreaux* ann. 1831 (G)—et 1909 p. 68. *R. cruciata* auct. non Bkr. nec Eckl.: Lewis 1950 p. 222. *R. vulgaris* Ecklon 1827 p. 18 pro parte, nom. nud.

This differs from the typical variety in the following features: *Stem* always very short and hidden by leaf bases. *Leaves* seemingly all basal, 2—3 mm diam. or wider, usually bent, minutely ciliate on the rib margins, grooves wide.

Bracteole submembranous or sometimes somewhat green in the centre, with wide brown, membranous margins. *Flowers* blue or blue-violet, or sometimes pink or white, with a yellow cup.

Holotype: *Verreaux* ann. 1831, sub *R. cruciata* var. *hirsuta* Beg. in G.

CLANWILLIAM. Olifants River: *Ecklon & Zeyher Irid. 206* (SAM partly, not in G).
MALMESBURY. Ysterfontein: *Johnson 156* (NBG).
CAPE. Mont. Leonis: *Ecklon 700* sub *R. vulgaris* (PRE, G, K, partly in S, etc.). Slopes of Lion's Head: *Salter SAM 52452, Salter 8205* (BOL). In campis graminosis prope C.T.: *Bolus 3734* (K partly). Above Sea Point: *Dod 1160* (BOL, K). Devil's Peak below Blockhouse: *Esterhuysen 17337* (BOL.) Little Lion's Head, Llandudno: *Acocks 1924* (S). Hout Bay Nek: *Mathews NBG 1656/15* (BOL). Kapflache: *Zeyher 196* partly (SAM). Observatory: *Dod 2659* (BOL, BM, K).
HERMANUS—CALEDON. Hermanus: *Guthrie* 7/96 (SAM).
STELLENBOSCH. Foothills of Simonsberg: *Richfield* May 1966 (NBG).
WITHOUT LOCALITY. *Verreaux* ann. 1831. *Prior* s.n. (K). *Roxburgh* s.n. (G). *Zeyher 1605* partly (SAM). *Oldenburg 279* (BM). Hb. Swartzii sub *Trichonema reflexum* Steud. (S).

The *Acocks* collection no. *1924* in S is labelled: "Flowers fragrant".

On account of the blue colour of the perianth, and the leaves which are more or less cross-shaped in transverse section, this variety was identified with *R. cruciata* by Béguinot, as *R. cruciata* var. *hirsuta*. The corm, however, with its crescent-shaped basal ridge, is typical of *R. flava*, and does not resemble that of *R. cruciata* (Jacq.) Bkr. which has a pointed base. The membranous bracteole is also typical of *R. flava*.

The following collections, cited with the typical variety, seem to connect var. *hirsuta* with the typical variety: *MacOwan 256* from near Bot River, Caledon, and *Salter 1191* from Hermanus. These have blue flowers, short, hidden stems, and broad, curved leaves which are, glabrous instead of ciliate.

16. **Romulea barkerae** De Vos sp. nov.

Fig. 25.

Cormus ca. 10 mm diam. basi oblique complanatus crista lunata ciliolata, tunicis rigidis laevibus brunneis, apice fibris 3—5 mm longis praedito. *Caulis* brevis vel ad 25 mm longus vaginis foliorum obtectus vel breviter supra vaginas exsertus. *Vaginae basilares* 2. *Folia basilaria* apparenter plura in plantis brevicaulibus (vel interdum 1) plus minusve 3-angularia vel anguste 3-alata, fere T-formia in sectione transversali, duobus sulcis latis, 11—20 cm longa 1,5—2,5 mm lata, marginibus angulorum ciliolata; *folia caulina* 1—2 breviora quam folium basilare. *Pedunculi* 30—45 mm longi semiteretes suberecti saepe ciliolati in angulis acutis. *Bractea* viridis marginibus membranaceis perangustis aegre manifestis, 15—18 mm longa subobtusa. *Bracteola* membranacea, interdum nervis rubellis. *Flores* 1—3 vel plures, 25—38 mm longi. *Tubus perigonii* 5—6 mm longus, infundibularis; *segmenta* anguste obovata vel anguste elliptica 18—28 mm longa 8—10 mm lata subobtusa vel subacuta vel minute emarginata alba, in fauce maculis magnis atratis aureolimbatis notata, segmenta exteriora

a dorso viridia. *Stamina* erecta in dimidio inferiore tubi perigonialis inserta; *filamenta* 5—6 mm longa basi minute pilosa; *antherae* 5—6 mm longae luteae. *Stylus* 10—12 mm longus; *stigmata* dimidium vel apices antherarum attingentia. *Capsulae* ca. 10 mm longae, in pedunculis recurvatis demum suberectis.

Holotype: *Barker NBG 273/67* in NBG.

Plants 12—20 cm tall. *Corm* ca. 10 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with minute parallel fibrils on the basal ridge, and apical fibres ca. 3—5 mm long. *Stem* short, hidden by the sheathing leaf bases or to 25 mm long, shortly

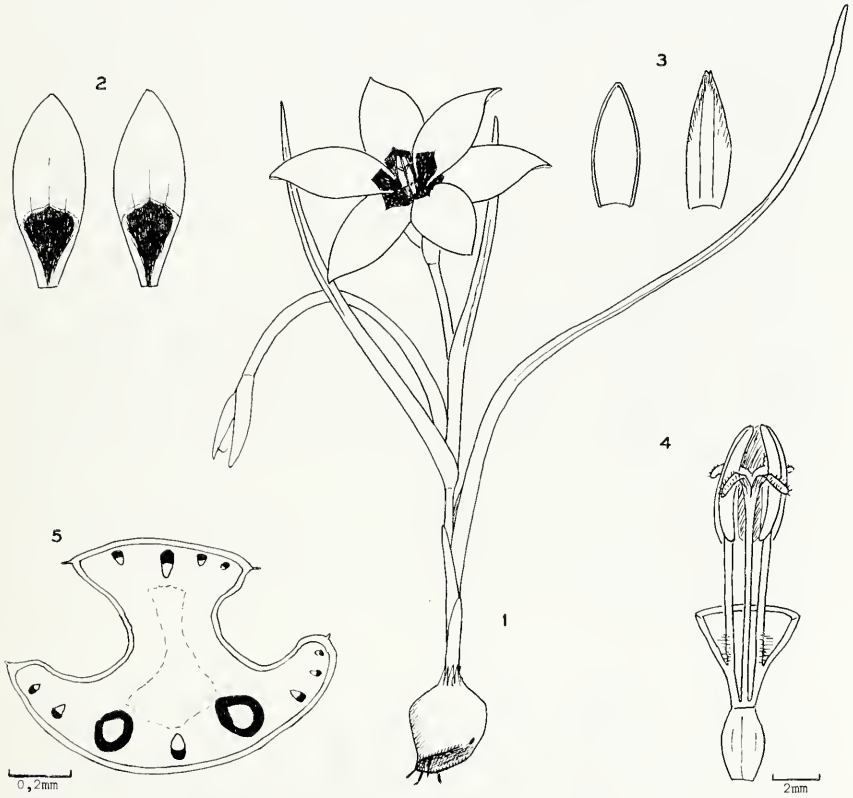


FIG. 25.

R. barkerae (*NBG 273/67*). 1, plant ×1. 2, perianth segments, upper surface. 3, bract and bracteole ×1. 4, pistil, stamens, and perianth tube. 5, transverse section of leaf.

extending from the leaf sheaths. *Basal sheaths* 2, up to 25 mm long. *Basal leaves* 1 or seemingly more in short-stemmed specimens, more or less 3-angled or narrowly 3-winged, almost T-shaped in transverse section, with two wide grooves, and a wide and narrow rib, 11—20 cm long, 1,5—2,5 mm wide, minutely ciliate on the margins of the angles; *cauline leaves* 1—2, shorter and sometimes wider than the basal leaf. *Peduncles* 30—45 mm long, semiterete, suberect, often minutely ciliate on the sharp angles. *Bract* green, with very narrow, hardly visible membranous margins, 15—18 mm long, subobtuse. *Bracteole* membranous, sometimes with reddish veins. *Flowers* 1—3 or more, 25—38 mm long. *Perigone tube* 5—6 mm long, funnel-shaped; *segments* narrowly obovate or narrowly elliptical, 18—28 mm long, 8—10 mm wide, subobtuse or subacute or minutely emarginate, white, with a large black blotch on each segment in the throat bordered by a narrow bright yellow zone, outer segments bright green on the backs. *Stamens* erect, inserted in the lower half of the perigone tube; *filaments* 5—6 mm long, minutely pilose at the bases; *anthers* 5—6 mm long, yellow. *Style* 10—12 mm long; *stigmas* reaching halfway up the anthers or to their tips. *Capsules* ca. 10 mm long, on recurved peduncles which straighten later.

VREDENBURG. Cape Columbine: *Barker NBG 273/67.*

Flowering period July.

This rare species, found only once, is readily distinguished by its white flowers with a large black blotch on each segment in the throat, each blotch bordered or flanked by a bright yellow zone; by its wholly scarious bracteole and its unusual leaves with only two grooves and two ribs, the two lateral ribs having fused with the median rib to form a single wide rib. This gives the leaf a more or less 3-angled or 3-winged appearance, and in transverse section it is almost T-shaped.

R. barkerae is probably related to *R. flava*, as its corm, single basal leaf, and wholly membranous bracteole indicate. It is not closely allied to the *Hirtae* in which the two-grooved leaves originated through the disappearance of the lateral ribs, the grooves on each side thus becoming confluent.

17. **Romulea saldanhensis** De Vos sp. nov.

Fig. 26.

Cormus ca. 10 mm diam. basi oblique complanatus crista lunata ciliata, tunicis rigidis laevibus brunneis, apice fibris 3—5 mm longis praedito. *Caulis* 5—35 cm longus erectus supra vaginas foliorum exsertus, prope apicem ramosus, vel aliquando brevis vaginis foliorum obtectus, in speciminibus fructiferis parum elongatus. *Vaginae basilares* 2. *Folia basilaria* apparenter plura in plantis brevicaulibus (vel interdum 1) filiformia 20—60 cm longa 1—2 mm diam. suberecta vel curvata, sulcis aliquantum angustis, basibus vaginantibus

FIG. 26.

R. saldanhensis (*de Vos* no. *1772*). 1, plant $\times \frac{7}{8}$. 2, corm seen from opposite side. 3, perianth segment, upper surface. 4, outer perianth segment, lower surface. 5, bract and bracteole $\times 1$. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf.



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4—8 mm latis; *folia caulina* breviora et latiora quam folium basilare. *Pedunculi* 30—60 mm longi semiteretes suberecti. *Bractea* viridis marginibus membranaceis perangustis aegre manifestis, anguste ovata 12—20 mm longa subobtusa vel acuta. *Bracteola* plerumque parum angustior quam bractea, submembranacea, subviridis in dimidio superiore, marginibus latis membranaceis incoloratis vel saepe brunneo-striatisve brunneo-punctatis, obtusa vel subobtusa. *Flores* 4—7 vel plures, 30—40 mm vel aliquando 20 mm longi. *Tubus perigonii* 3—5 mm longus campanulatus; *segmenta* anguste obovata 20—30 mm longa 8—14 mm lata acuta vel obtusa interdum minute emarginata lutea, basi striis tenuibus atratis, segmenta exteriora a dorso lutea saepe irregulariter brunneo-notata in zona lata media. *Stamina* erecta prope fundum perigonii inserta flava; *filamenta* 5—7 mm longa, basi pilosa, in dimidio inferiore minute pilosa; *antherae* 5—7 mm longae, primo apicibus conjunctis. *Stylus* 12—18 mm longus; *stigmata* aegre apices antherarum attingentia vel ad 4 mm antheras superantia. *Capsulae* ellipsoideae ca. 10 mm longae, in pedunculis curvatis demum suberectis.

Holotype: *de Vos 1772* in STE.

Plants 20—60 cm tall. *Corm* ca. 10 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with fine parallel fibrils on the basal ridge, and apical fibres 3—5 mm long. *Stem* 5—35 cm long, erect, extending above-ground, branched at the top, or sometimes short and hidden by the sheathing leaf bases, elongating somewhat in fruiting specimens. *Basal sheaths* 2, 20—80 mm long. *Basal leaves* 1 or seemingly more in short-stemmed specimens, filiform, 20—60 cm long, 1—2 mm diam., suberect or curved, grooves rather narrow, sheathing leaf bases 4—8 mm wide; *cauline leaves* few, shorter and wider than basal leaf. *Peduncles* 30—60 mm long, semiterete, suberect. *Bract* green, with very narrow, hardly visible, membranous margins, narrowly ovate, 12—20 mm long, subobtuse or acute. *Bracteole* usually somewhat narrower than the bract, submembranous, greenish in the upper half, with wide colourless or frequently brown-streaked or brown-speckled membranous margins. *Flowers* 4—7 or more, 30—40 mm or sometimes only 20 mm long. *Perigone tube* 3—5 mm long, campanulate; *segments* narrowly obovate, 20—30 mm long, 8—14 mm wide, acute to obtuse, sometimes minutely emarginate, cadmium-yellow or golden-yellow (RHS 14A, 17B, C), with slender dark lines in the cup, outer segments yellow on the backs and frequently with irregular brown markings in a wide median zone. *Stamens* erect, inserted near the base of the perigone tube, yellow; *filaments* 5—7 mm long, pilose at base and minutely pilose in lower half; *anthers* 5—7 mm long, at first joined at the tips. *Style* 12—18 mm long; *stigmas* hardly reaching the anther tips or up to 4 mm higher. *Capsules* ellipsoid, ca. 10 mm long, on peduncles sharply curved from the bases, and later suberect. *Chromosome number* 2n = 24 (*de Vos 1773*).

VREDENBURG. Steenberg Cove Vlei: *Compton 15926* (NBG). Between Vredenburg and Steenberg Cove: *Lewis 1060* (SAM). Between Vredenburg and St. Helena Bay: *Leighton 599* (BOL). SW of Military Academy, Saldanha: *de Vos 1772*. Near Paternoster: *de Vos 1773*.
VREDENBURG—HOPEFIELD. Saldanha Bay: *Marloth 8027* (PRE).
HOPEFIELD. Near Geelbek: *de Vos 2040*.
MALMESBURY. Swartwater near Darling: *Barker 10649* (NBG).

Flowering period August to September.

In moist sandy or clayey localities at low altitude.

This is closely related to *R. flava*, and was mentioned as a variety of this species (de Vos 1965: 138). It differs, however, in its slightly greener bracteole, its slightly shorter and wider perianth tube, and in its bright cadmium or golden-yellow perianth which often has irregular brown markings on the backs of the outer segments.

Two forms can be recognised: (1) a more robust form found at the edge of a seasonal vlei, with long styles and characteristic brown markings on the backs of the outer perianth segments, and (2) a smaller form on moist sandy or clayey soil with shorter styles and hardly any markings on the reverse of the segments. As these forms are completely interfertile, with 95 per cent apparently fertile pollen and with completely viable seeds, they are put into one species. Plants of the F_1 generation show intermediate characters, with styles reaching the anther tips or overtopping them slightly, and with faint markings on the backs of the outer perianth segments.

18. **Romulea citrina** Bkr. Handb. Irid. p. 100 (1892) et 1896 p. 38; Klatt 1895 p. 163; Béguinot 1907b p. 114 et 1909 p. 106; de Vos 1965 p. 138.

Fig. 11, 27.

Plants 10—35 cm or up to 45 cm tall. *Corm* obovoid, 8—15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, light brown, with fine parallel fibrils on the basal ridge, and apical fibres 3—5 mm long. *Stem* short and hidden or up to 20 cm long, erect and shortly extending from the leaf bases. *Basal sheaths* 1—2, 10—50 mm long. *Basal leaves* 2 or seemingly more in short-stemmed forms, filiform, subterete or compressed cylindrical, 10—45 cm long, 0,7—1,5 mm diam., suberect or slightly curved, grooves narrow, sheathing leaf bases 4—8 mm wide; *cauline leaves* 1—2 or more, shorter than basal leaves and often with wider sheaths. *Peduncles* 30—100 mm long, semiterete, suberect. *Bract* green with very narrow, hardly visible membranous margins, narrowly ovate to almost narrowly triangular, 10—25 mm long, obtuse to acute. *Bracteole* often somewhat shorter than the bract, green with wide brown-streaked or brown-edged membranous margins, tip green or slightly scarious, subacute or minutely emarginate. *Flowers* 1—4 or more, 22—40 mm long. *Perigone tube* 4—7 mm long, funnel-shaped; *segments* narrowly obovate to narrowly elliptical, 20—32 mm long, 8—10 mm wide or rarely only 5 mm, acute to subobtuse, lemon-yellow (RHS 8A) sometimes darker

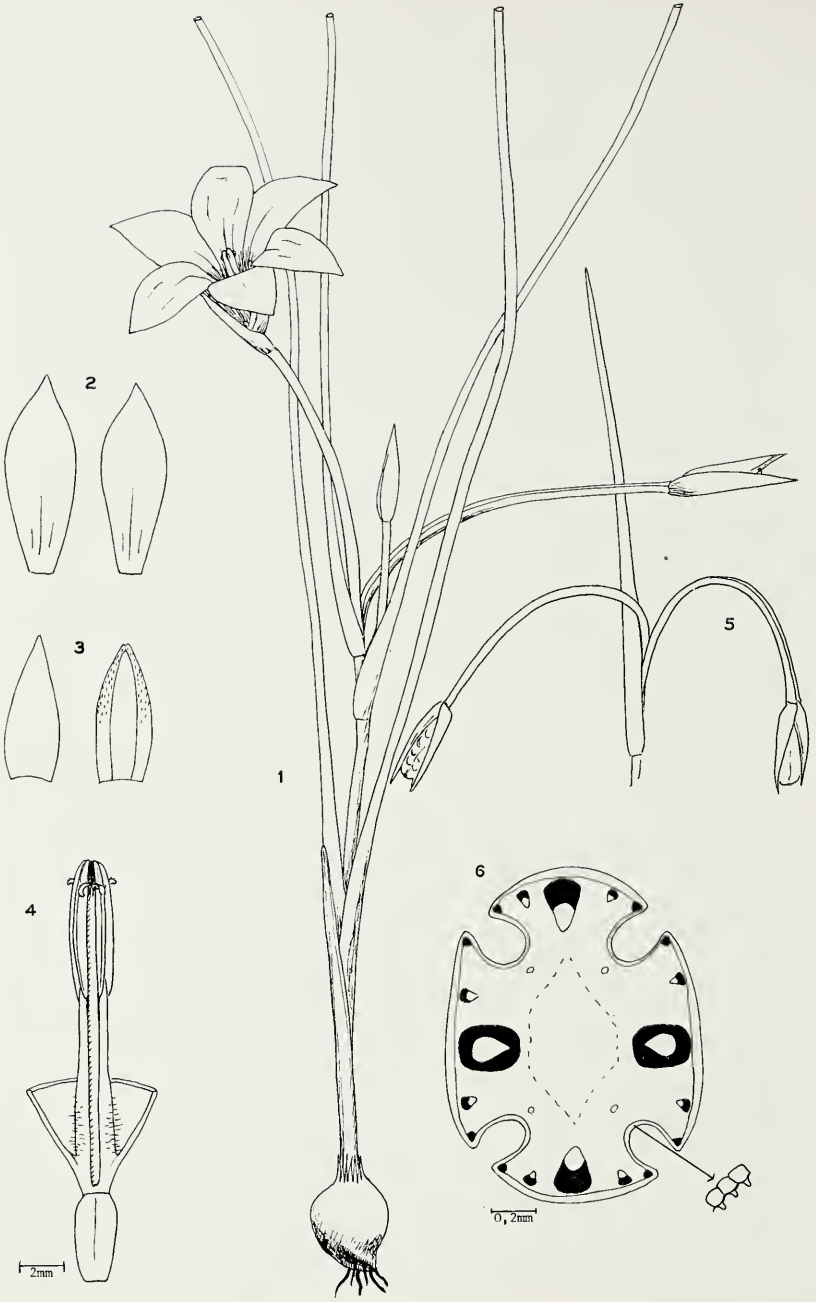


FIG. 27.

R. citrina (*de Vos* no. *1694*). 1, plant ×1. 2, outer and inner perianth segments. 3, bract and bracteole ×1. 4, pistil, stamens, and perianth tube. 5, ripening capsules ×1. 6, transverse section of leaf.

or paler yellow in the cup, outer segments often greenish or brownish on the backs. *Stamens* erect, inserted near the base of the perigone tube, yellow; *filaments* 5—8 mm long, minutely pilose in the lower half; *anthers* 4—7 mm long. *Style* 10—15 mm long; *stigmas* ca. 2—3 mm long, reaching the anther tips or slightly higher or lower. *Capsules* shortly cylindrical, 10—15 mm long, on arcuate peduncles which straighten later. *Chromosome number* 2n = 24 (*de Vos 1694*).

Holotype: *H. Bolus 6619* in K. Isotypes in BOL, GRA.

NAMAQUALAND. Near Modderfontein: *Bolus 6619*. Brakdam: *Schlechter 11121* (BOL, PRE, GRA, K, S, Z), *Barker 3651* (NBG, BOL), *7409* (NBG) Kamieskroon: *L. Bolus BOL 24346*, *Compton 11394* (NBG), *Thorne SAM 48858*. South of Kamieskroon: *Salter 3827* (BOL) *Esterhuysen 5821* (BOL). Grootvlei: *Compton 6607* (NBG), *Lewis 5216* (SAM), *de Vos 1694*. Near Darter's grave: *Lewis 1630* (SAM), *Barker 3676* (NBG). Between Garies and Springbok: *Lewis SAM 58822*, *Leighton 1151A* (BOL). Between Garies and Bitterfontein: *Leipoldt 3826* (BOL). De Kom. Kamiesberge: *Leipoldt 3542* (BOL). Leliefontein: *Rodin 1452* (BOL, PRE, UC). Near Eselsfontein: *Van der Schyff & Schweickerdt 5778* (PRE). 14 mls. W by S of Springbok: *Acocks 19440* (PRE, K, M).
CLANWILLIAM. Citrusdal: *Lindeberg* Sept. 1936 (S).

On sandy or stony ground at low and higher altitudes.

This species can be readily recognised by its pale yellow flowers, two basal leaves in long-stemmed forms, submembranous bracteole with wide membranous margins, and corm of the ciliata type. With a single, perhaps dubious, exception it is limited to Namaqualand.

R. citrina is allied to *R. leipoldtii* and *R. flava*. It differs from *R. leipoldtii* in its uniformly pale yellow perianth with slightly wider segments. From *R. flava* it is distinguished by its bracteoles which are greener in the centre, by its longer peduncles, and by the presence of two basal foliage leaves when the stem is elongated. In leaf structure it differs from other species of the subsection *Ciliatae* in its rib margins which are strengthened by small subepidermal fibre strands.

19. **Romulea pearsonii** De Vos sp. nov.

Fig. 12, 28.

Cormus 8—10 mm diam, basi oblique complanatus crista parva lunata ciliata, tunicis rigidis laevibus brunneis, apice aliquot fibris 2—5 mm longis praedito. *Caulis* perbrevis vel ad 30 mm longus, plerumque vaginis foliorum obtectus, in plantis fructiferis ad 10 cm elongatus. *Vaginae basilares* 2. *Folia* 3—5, praecipue basilaria, filiformia 10—25 cm longa, ad 1 mm diam., plerumque curvata, sulcis angustis, basibus vaginantibus ad 4 mm latis. *Pedunculi* 30—50 mm longi semeteretes erecti vel leviter curvati. *Bractea* viridis marginibus membranaceis angustis brunneo-striatis dilatatis ad apicem membranaceum, anguste ovata vel fere ovata, concava 15—25 mm longa, dense valdeque nervata, subobtusa vel acuta. *Bracteola* viridis in parte media, marginibus et apice latis membranaceis brunneo-striatis, obtusa vel emarginata. *Flores* 2—3 interdum 1, 30—50 mm longi. *Tubus perigonii* 4—5 mm longus, fere cyathiformis, flavus;

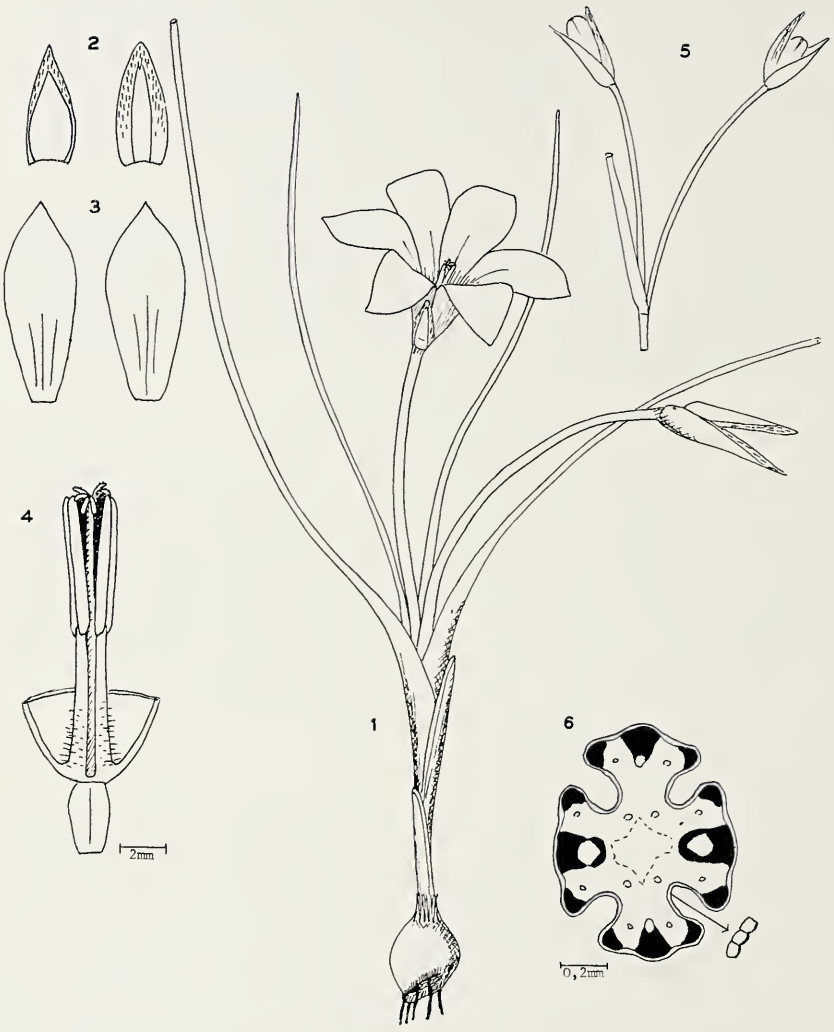


FIG. 28.
R. pearsonii (*de Vos* no. *1917*). 1, plant $\times\frac{2}{3}$. 2, bract and bracteole $\times 1$. 3, outer and inner perianth segments. 4, pistil, stamens, and perianth tube. 5, almost mature capsules $\times 1$. 6. transverse section of leaf.

segmenta anguste obovata vel exteriora interdum anguste elliptica et paulo longiora et angustiora quam interiora, 25—40 mm longa 8—14 mm lata acuta vel subobtusa citrina, segmenta exteriora a dorso flavo-virentia vel infuscatave rubiginoso-nervata. *Stamina* erecta prope fundum perigonii inserta, flava; *filamenta* 6—8 mm longa, basi vel interdum ad dimidium pilosa; *antherae* 7—10 mm longae, interdum aliquantum patentes. *Stylus* 12—18 mm longus; *stigmata* apices antherarum attingentia vel paulo inferiora. *Capsulae* breviter cylindricae, 10—15 mm longae, in pedunculis suberectis vel leviter curvatis.

Holotype: *Pearson, Sladen Mem. Exp. 6550* in BOL. Isotype in K.

Plants 10—25 cm tall. *Corm* 8—10 mm diam., obliquely flattened towards the base, with a small crescent-shaped basal ridge; tunics hard, smooth, brown, with minute parallel fibrils on basal ridge, and a few apical fibres 2—5 mm long. *Stem* very short or to 30 mm long, usually hidden by the leaf bases, elongating up to 10 cm in fruiting stages. *Basal sheaths* 2, 10—30 mm long. *Leaves* 3—5, mainly basal, filiform, 10—25 cm long, up to 1 mm diam., usually curved, grooves narrow, sheathing leaf bases to 4 mm wide. *Peduncles* 30—50 mm long, semiterete, erect or slightly curved. *Bract* green with narrow brown-streaked membranous margins which widen to a membranous tip, narrowly ovate to almost ovate, concave, 15—25 mm long, with closely spaced, rather stout veins, subobtuse to acute. *Bracteole* green in centre with wide brown-streaked membranous margins and tip, obtuse or emarginate. *Flowers* 2—3, sometimes 1, 30—50 mm long. *Perigone tube* 4—5 mm long, almost cup-shaped, yellow; *segments* narrowly obovate or the outer sometimes narrowly elliptical and slightly longer and narrower than the inner, 25—40 mm long, 8—14 mm wide, acute to subobtuse, lemon-yellow (RHS 8A), outer segments on backs yellowish-green or brownish or veined with reddish-brown. *Stamens* inserted near the base of the perigone tube, yellow; *filaments* 6—8 mm long, pilose near base and sometimes to the middle; *anthers* 7—10 mm long, sometimes slightly patent. *Style* 12—18 mm long; *stigmas* reaching anther tips or below them. *Capsules* shortly cylindrical, 10—15 mm long, on almost straight or slightly curved peduncles. *Chromosome number* 2n = ca. 24 (*de Vos 1917*).

NAMAQUALAND. Kamiesberg, Khamsoap Ravine: *Pearson, P. Sladen Mem. Exp. 6550.* Kamiesberge, 3 mls. S of Leliefontein: *de Vos 1613.* Near Leliefontein: *Schweickerdt 2550* (PRE, K). Kamiesberge, Eselsfontein: *de Vos 1616.* W of Kamieskroon: *Rourke* 18.7.68 (NBG). Grootvlei: *de Vos 1917, 2174, Acocks 19466* (PRE, K, M). Towards Leliefontein: *Lorenzo 17* (STE).

Flowering period August to September.

On sandy soil.

This species is characterised by a corm of the ciliata type, by its large, pale yellow perianth without dark markings inside, and by a bract and bracteole with

distinct brown-streaked membranous margins and tips. The last named feature of bract and bracteole distinguishes it from the sympatric *R. citrina* which also has yellow flowers.

R. pearsonii resembles *R. luteoflora* in its bract and bracteole and in its flower colour, but can be readily distinguished from the latter species by its different corm, and by its fruiting specimens in which the stem elongates and the peduncles remain straight or bend only slightly, whereas in *R. luteoflora* the peduncles curl up when drying out and the stem remains short.

In leaf structure *R. pearsonii* differs from the other Ciliatae: each rib has a single large vascular bundle with a large sclerenchymatic bundle sheath placed against the epidermis, and two small, sunken vascular bundles without sclerenchyma; the rib margins are strengthened by large subepidermal fibre bundles and the epidermal cells are rather small. These features, and also the brown-streaked membranous margins and tips of the bract and bracteole which are so typical of *R. atrandra* and *R. luteoflora*, show that, morphologically at least, *R. pearsonii* stands between the Ciliatae and the Atrandrae. It could, perhaps, even have originated from *R. luteoflora*, which reaches as far north as Namaqualand. The other possibility, that it could perhaps be a stage towards the development of the Atrandrae, is improbable, considering the small range of *R. pearsonii* and the wide range of the relevant species of the Atrandrae.

20. **Romulea oliveri** De Vos sp. nov.

Cormus ca. 15 mm diam., basi oblique complanatus crista lunata ciliolata, tunicis rigidis laevibus brunneis, apice fibris ca. 20 mm longis praedito. *Caulis* 3—10 cm vel ad 30 cm longus supra vaginas foliorum extensus, vel obteetus. *Vagina basilaris* 1 visa. *Folia basilaria* probabiliter 2, filiformia subteretia, ca. 15 cm longa vel longiora, ca. 1 mm diam., recurva, sulcis angustis, nervo valido in quaque porca, basibus vaginantibus ca. 3 mm latis; *folia caulina* plerumque 2, erecta, basibus vaginantibus latioribus. *Pedunculi* 35—50 mm longi semiteretes, ereeti vel curvati et patentes. *Bractea* viridis, marginibus membranaceis distinctis angustis brunneolis vel brunneo-punctatis, rigida, anguste ovata, 17—30 mm longa, nervis approximatis, saepe nervo medio validiore, subobtusa. *Bracteola* viridis, marginibus membranaceis latioribus, brunneis vel brunneo-striolatis. *Flores* 2—4, 35—45 mm longi. *Tubus perigonii* 4—5 mm longus infundibularis; *segmenta* anguste obovata vel anguste elliptica 25—35 mm longa, ca. 10 mm lata, subobtusa, minute emarginata, intense magenteo-rosea, basi purpureo et luteo striata, segmenta exteriora a dorso lutea, 5-vittata, versus margines pinnatinervia. *Stamina* erecta, prope basin tubi perigonialis inserta, non dimidium perigonii attingentia; *filamenta* 4 mm longa, basi minute pilosa, lutea vel aurantiaca vel versus basin crocea; *antherae* 8—10 mm longae, luteolae. *Stylus* 10—12 mm longus; *stigmata* infra apices antherarum attingentia.

Holotype: *Oliver 3169* in STE.

Plants 15—30 cm tall. *Corm* ca. 15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with fine parallel fibrils on the basal ridge, and apical fibres ca. 20 mm long. *Stem* 3—10 cm or up to 30 cm long, extending from the sheathing leaf bases, or hidden. *Basal sheath* 1 seen, 35 mm long. *Basal leaves* probably 2, filiform, subterete, ca. 15 cm long or longer, ca. 1 mm diam., recurved, grooves narrow, with a strong vein in each rib, sheathing leaf bases ca. 3 mm wide; *cauline leaves* usually 2, erect, with wider leaf bases. *Peduncles* 35—50 mm long, semiterete, erect to bent and patent. *Bract* green with distinct, narrow, brownish or brown-speckled, membranous margins, rigid, narrowly ovate, 17—30 mm long, with closely spaced veins and often a stronger median vein, subobtuse. *Bracteole* green, with wider brown or brown-streaked membranous margins. *Flowers* 2—4, 35—45 mm long. *Perigone tube* 4—5 mm long, funnel-shaped; *segments* narrowly obovate or narrowly elliptical, 25—35 mm long, ca. 10 mm wide, subobtuse, minutely emarginate, bright rosy-magenta, cup purple and yellow-striped, outer segments on the backs yellow with 5 purple stripes and fine feathered veining towards the margins. *Stamens* erect, inserted near the base of the perigone tube, not reaching halfway up the perigone; *filaments* 4 mm long, slightly pilose at the bases, yellow to orange or darker towards the bases; *anthers* 8—10 mm long, pale yellow. *Style* 10—12 mm long; *stigmas* below the anther tips.

NAMAQUALAND. Farm Welkom, SE of Kamiesberg peak: *Oliver 3169*, Sept. 1970.

Flowering period September.

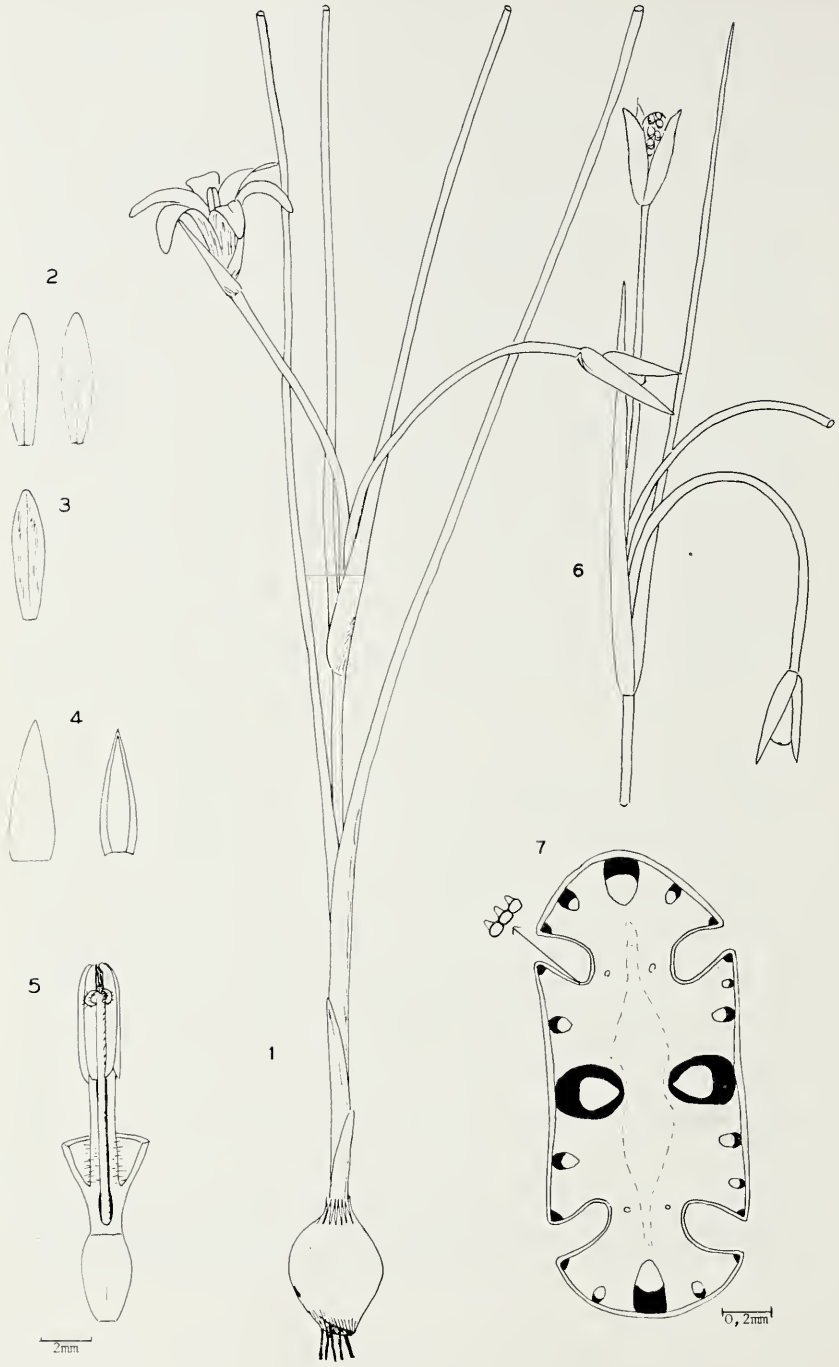
On moist, west facing, sandy slope near top of pass, ca. 1400 m altitude, locally frequent.

This recently discovered, new species is distinguished by its large, bright rosy-magenta flowers with a very short perianth tube, its long green bract and bracteole, both with distinct brown or brownish membranous margins and the bract often with a stronger median vein, and by anthers which are longer than the filaments. It is probably closely allied to *R. pearsonii*, from which it differs principally in its flower colour and bract. The leaf structure of the two species is similar. In this they differ from other species of the Ciliatae.

21. **Romulea gigantea** Beg. Bot. Jb. 38: 333 (1907a) et 1907b p. 104 et 1909 p. 76; Martin & Noel 1960 p. 30; de Vos 1965 p. 138.

Fig. 29.

Plants 20—50 cm tall or sometimes taller. *Corm* 7—15 mm diam., oblique at the base, with a small crescent-shaped basal ridge; tunics hard, smooth, brown, with apical fibres 2—5 mm long and a basal row of sharply bent fibrils


2
3
4
5
2mm
1
6
7
0, 2mm

which ultimately break on the ridge into slender parallel, often attenuate fibrils (teeth) 2—3 mm long. *Stem* 5—20 cm or sometimes to 50 cm long, extending above-ground, to 3 mm diam., ribbed or smooth, or short and hidden by the leaf bases. *Basal sheaths* 1—3, up to 70 mm long. *Basal leaves* 2 or seemingly more in short-stemmed forms, compressed cylindrical, erect or slightly bent, 20—50 cm long or sometimes longer, 1—3 mm diam., with more than one vein in each rib, grooves usually narrow, sheathing leaf bases to 6 mm wide; *cauline leaves* few, with leaf sheaths up to 10 mm wide. *Peduncles* 20—75 mm long, sometimes elongating to 100 mm after flowering, semiterete. *Bract* green, sometimes with very narrow, hardly visible membranous margins, almost narrowly triangular, 10—20 mm long, obtuse to acuminate, usually reaching about three-quarters up the perigone. *Bracteole* usually shorter than the bract, green in the centre with wide brown-edged membranous margins narrowing to a green tip. *Flowers* mostly 3—4, 15—22 mm long. *Perigone tube* 2—3 mm long, narrowly funnel-shaped; *segments* narrowly elliptical, 10—15 mm long, 3—4 mm wide, subacute to obtuse, white or pale lilac (RHS 36C, D) or bluish-white, with a slender dark median line, cup greenish-yellow; outer segments irregularly marked on the backs with green and purplish-brown or with 3 dark longitudinal stripes. *Stamens* erect, reaching more than halfway up the perigone; *filaments* 3—7 mm long, sometimes with one filament shorter, minutely pilose in lower half; *anthers* 3—4 mm long, pale yellow, somewhat exserted. *Ovary* 3—4 mm long; *style* 8—9 mm long; *stigmas* narrowly ligulate, channelled above, sometimes reaching to the anther tips. *Capsules* 8—10 mm long, shortly cylindrical, on peduncles which become curved after flowering and erect later. *Chromosome number* 2n = ca 42, 44 (*STE 30197*, *de Vos 1980*, *1910*, *1974*, *1978*).

Holotype: *Rust 622* in B.

CALEDON. Kleinmond, behind rocky coast: *de Vos 1978*, *1980*.
SWELLENDAM. Between Stormsvlei and Swellendam: *de Vos 1910*. 14 mls. W of Swellendam: *de Vos 1974*.
RIVERSDALE. *Rust 622*. Albertinia: *Fries*, *Norlindh & Weimarck 1369* (PRE, SAM, K, LD, S).
BATHURST. Kowie: *Britten 770* (GRA, PRE). Kowie River, in vlei on east bank: *Bain RUH 3256*. Kowie salt marsh, E side towards fresh water end: *Martin STE 30197*. Port Alfred, salt marsh: *Martin STE 30196*.

Flowering period September to October.

In moist localities.

The type specimen is now without corm, but Béguinot (1970a) described it vaguely as "cormo ovato maximo tunicis coriaceis castaneis tecto". The present description of the corm is from specimens collected near the type locality (*Fries e.a. 1369*) and in the districts of Bathurst, Swellendam and Caledon.

In its long-stemmed habit this species resembles larger specimens of *R. longipes*, and Béguinot considered these two species to be related. *R. gigantea*

FIG. 29.

R. gigantea (*de Vos* no. *1910*). 1, plant ×1. 2, perianth segments. 3, outer segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, ripe and ripening capsules ×1. 7, transverse section of leaf.

differs, however, in its much smaller flowers, usually longer peduncles, in its tunic fibrils at the base of the corm and in the anatomical structure of the leaves.

In anatomical details the leaf somewhat resembles that of *R. rosea*, and Béguinot placed the species in his stirps Roseae. Although it probably has some affinity with the Roseae, it also shows divergent characters such as the elongated stem and the small, crescent-shaped ridge at the base of the corm. The tunical fibrils which bend sharply over the basal ridge of the corm and later break off at the bend, may show that the species may be intermediate between the Roseae and Ciliatae.

R. gigantea resembles *R. pratensis* in its small pale flowers, but it is readily distinguished from the latter by its greener bract and bracteole, parallel basal fibrils on the corm which do not form small fibril clusters, and often elongated stem.

Specimens from the Bathurst district, when grown in Stellenbosch in the open in full sunshine, had short stems hidden by the sheathing leaf bases, and somewhat resembled *R. pratensis* and *R. rosea* var. *australis* in general habit. When shaded during the flowering period, the stems elongated to 25 cm.

1.2 Subsection Hirsutae Beg.

Stirps *Hirsutae* Béguinot 1908a p. 159 pro parte et 1909 p. 87 pro parte.

Corm symmetrical, campanulate, with a circular basal ridge; tunics on the basal ridge split irregularly or into a fringe of parallel fibrils. *Stem* short or elongated. *Leaves* usually 2 basal and 1 or more cauline, or all seemingly basal in short-stemmed forms, generally terete. *Peduncles* becoming curved or rarely patent after flowering. *Bract* green with very slender veins. *Bracteole* green with wide membranous margins narrowing to a green tip. *Flowers* large to small, variously coloured.

Type species: *R. hirsuta* (Klatt) Baker.

Leaf anatomy.—Upper unifacial part 4-ribbed and 4-grooved, the grooves narrow or rarely wide and sometimes with a narrow extra rib in each groove. Each rib with a single vascular bundle, or rarely 3 or more. Rib margins glabrous or sparsely ciliolate, without fibres. Epidermal cells in the grooves with low papillae or without papillae.

Béguinot (1909) placed *R. hirsuta*, *R. amoena*, *R. tortilis* and *R. klattii*, in addition to three other species with different corm types, in his stirps *Hirsutae*, stressing their similar leaf anatomy. Another species with a campanulate corm, *R. sublutea*, was placed in the stirps *Subluteae* Beg. because of its yellow flowers. The present classification gives a more natural grouping of allied species, their external morphology and leaf anatomy, as well as their chromosome numbers, indicating their close affinity. The species now grouped in the *Hirsutae* are so













FIG. 30.
R. hirsuta var. *hirsuta*. About natural size.

FIG. 31.
R. sladenii. About natural size.

FIG. 32.
R. aquatica. About natural size.

FIG. 33.
R. gracillima. About natural size.

FIG. 34.
R. tortuosa ssp. *aurea*. About natural size.

FIG. 35.
R. sphaerocarpa. About natural size.

closely related that they might even be regarded as belonging to one large aggregate species.

R. amoena, which also has a campanulate corm, is not very closely allied to the *Hirsutae* and is placed in a separate section on account of its fibril clusters at the base of the corm.

R. pudica Ker, figured in Bot. Mag. t. 1244 with a campanulate corm, might perhaps belong to this subsection. (See under Excluded Species.)

22. **Romulea triflora** (Burm. f.) N. E. Brown, Kew Bull. 1929: 131; Lewis 1950 p. 222.

Crocus triflorus Burman 1768 p. 2.

Ixia filifolia var. *A*, F. De la Roche 1809 t. 251 fig. 2; Poiret 1813 p. 201 pro parte. *I. crocea* Thunberg 1811 p. 218 et 1823 p. 55; Juel 1918 p. 112.

Trichonema filifolium Ker 1827 p. 82: non Klatt 1865–66.

Geissorhiza recurvifolia Klatt 1865–66 p. 655 pro parte.

Romulea filifolia Ecklon 1827 p. 20: non Klatt nec Baker nec Béguinot. *R. sublutea* Baker 1877 p. 88 et 1892 p. 100 (excl. syn. *R. aurea* Klatt) et 1896 p. 37 excl. syn. *R. aurea* Klatt; Klatt 1882 p. 399 et 1895 p. 167; Béguinot 1907b p. 112 et p. 475 et 1909 p. 98 excl. aliquot cit.; N. E. Brown 1928 p. 16. *R. schlechteriana* Schinz 1895 p. 395—holotype: *Schlechter 852* (Z); Béguinot 1909 p. 101 pro syn.

Bulbocodium filifolium (Eckl.) Kuntze 1891 p. 700. *B. subluteum* (Bkr.) Kuntze p. 701.

?*Ixia sublutea* Lamarck 1789 p. 335 et ?*Geissorhiza sublutea* Ker 1805 p. 223 sec. Baker & Béguinot, but N. E. Brown (1929 p. 131) doubted the correctness of this identification. *R. aurea* auct. non Klatt: Baker 1896 p. 37 pro syn.

Icones: Redouté 1809 t. 251 fig. 2 sub *Ixia filifolia* var. *A;* this work Fig. 36.

Plants 10—30 cm tall. *Corm* campanulate, 6—12 mm diam., flat at the base with a wide circular basal ridge; *tunics* hard, smooth, dark brown, with fine parallel fibrils on the basal ridge and apical fibres ca. 5 mm long. *Stem* 2—15 cm long, usually extending above-ground or sometimes hidden by leaf sheaths. *Basal sheaths* 1—2, 10—50 mm long. *Basal leaves* usually 2, or apparently more in short stemmed forms, filiform, glabrous, 6—30 cm long, usually 0,5—1 mm diam., suberect or slightly bent, with a slender vein in each rib, grooves narrow, sheathing leaf bases 1—3 mm wide; *cauline leaves* 0—3 or more, shorter than the basal leaves and with slightly wider leaf sheaths. *Peduncles* 15—70 mm long, semiterete. *Bract* green, more or less narrowly triangular 10—20 mm long, acute to subobtuse. *Bracteole* green with wider colourless or brown-edged membranous margins narrowing to a green tip. *Flowers* 2—4 or more, 20—40 mm long. *Perigone tube* 4—6 mm long, widely funnel-shaped; *segments* narrowly obovate, 14—30 mm long, 7—12 mm wide, acute to subob-

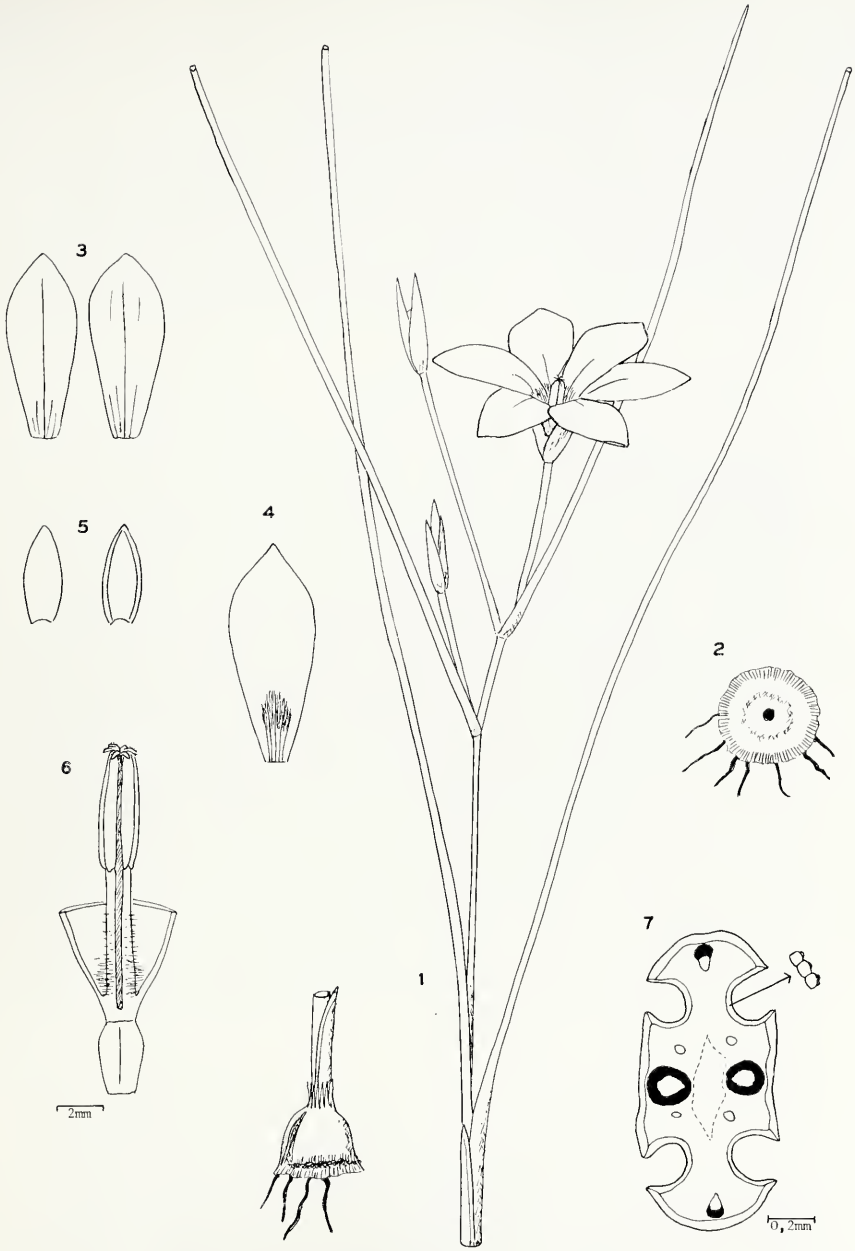


FIG. 36.

R. triflora (*de Vos* no. *1918*). 1, plant ×1. 2, base of corm. 3, outer and inner perianth segments ×1. 4, perianth segment with brown blotch, from near Darling. 5, bract and bracteole ×1. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf.

tuse, golden-yellow (RHS 10A, 11A, 12B), sometimes with a slender dark median line or a diffuse brown zone in the throat, rarely white with a yellow cup; sometimes greenish on the backs towards the tips. *Stamens* erect, yellow; *filaments* 4—5 mm long, pilose near the base; *anthers* 4—7 mm long or sometimes shorter. *Style* 9—18 mm long; *stigmas* 1,5—2 mm long, reaching the anther tips or slightly lower or higher. *Capsules* ca. 10 mm long, shortly cylindrical, on patent peduncles. *Chromosome number* 2n = 24 (*de Vos 1882*), 22? (*de Vos 1918*).

Holotype: *Burman* s.n. sub *Crocus triflorus* in G.

CLANWILLIAM. *Ecklon & Zeyher PRE 22293.* Elandskloof: *Stokoe SAM 68325.* Warm Baths: *Edwards BOL 14431.*

CERES. Moist grassy places: Hb. S. Afr. Fl. s.n. (GRA).

WORCESTER. Bainskloof: *Salter 6823* in BOL, SAM. NE of Bainskloof, near bridge of Breërivier: *de Vos 1882* partly.

MALMESBURY. Near Darling: *L. Bolus 17186* (K). Darling flats: *Lötter STE 16853.* Between Mamre and Darling: *Esterhuysen 18868* (BOL). Mamre hills: *Compton 13771* (NBG). Beyond Mamre: *Leighton 244* (BOL).

CAPE. Pr. b. Sp.: *Ludwig* sub *R. filifolia* Eckl. (OXF). *Leibold 228* (Z). Cape Flats: *Zeyher 423* (SAM), *4148* (SAM, K). Near Cape Town: *Bolus 3760* partly (GRA). Rondebosch: *Schlechter 852* (Z). Near Claremont: *H. Bolus 3760* (PRE, NU, not in K). Kirstenbosch: *Esterhuysen 11839* (BOL). Kenilworth Race Course: *Barker 4796* (NBG). Near Wynberg: *Schlechter 1543* partly (GRA, Z, G, GH), *Marloth 208* (PRE). Hout Bay: *Ecklon* s.n. sub *R. filifolia* Eckl., (S) *Conpton 9155* (NBG). Bergvliet: *Salter 7641* (SAM). Steenberg: *Salter SAM 54387, Esterhuysen 15826* (BOL, STE). Muizenberg Mt.: *Salter 2702* (K). Kommetjie: *Dod 1619* (BOL, K). Fish Hoek: *Dod 1620* (BOL, K). Fish Hoek Flats: *Salter 7400* (SAM), *Peers* s.n. (BOL), *de Vos 1918.* Redhill: *Acocks 329* (S). W side of Redhill: *Hafström & Acocks 329* partly (PRE). Simon's Bay: *Wright 279* (K). Near Bonteberg: *Lewis 68* (SAM), *Barker 815* (NBG). Krom River Vlei: *Barker 3881* (NBG). Olifantsbos: *Lewis 1468* (SAM), *Salter 3950* (K). Sirkelsvlei: *Compton 16330* (NBG). Smitswinkel: *Lewis 758* (SAM), *Steyn 664* (NBG). Near Vasco de Gama: *Hutchinson 659* (BOL, PRE, K). Kogelfontein: *Barker 794* (NBG). Cape Point: *Compton 18301* (NBG).

STELLENBOSCH. Banhoekkloof: *Stokoe SAM 58098.* Jonkershoek: *Strey 572* (PRE), *Kerfoot 5899* (NBG), *Rehm* 13.8.46 (M).

CALEDON, HERMANUS. *Pappe SAM 25177.* Hills above Caledon: *Zeyher 4045* partly (SAM). Swartberg near Caledon: *Zeyher 4045* (K, S). Kraalfontein: *Compton 13474* (NEG). Witvoetskloof: *de Vos 2132.* Road to Stanford: *de Vos 2141.*

?PORT ELIZABETH. Near Port Elizabeth: *Drège 8451* partly (S). This locality record is probably incorrect.

WITHOUT LOCALITY. *Burman* sub *Crocus triflorus* (G). *Thunberg* sub *Ixia crocea* Thunb. (S). *Drège Irid. 205* (G), *Irid. 206* (G partly). *Ecklon & Zeyher* s.n. (BOL). *Zeyher 426* (PRE, SAM). *Grey*, cited in Fl. Cap., (K).

Flowering period August to October.

On sandy loam at low altitudes.

This species is readily distinguished by its campanulate corm with a wide flat base, and its generally golden-yellow flowers. It is closely related to *R. hirsuta*, from which it differs chiefly in the absence of anthocyanin in its flowers, by its glabrous leaves, and more or less narrowly triangular bract. In badly preserved herbarium specimens it is sometimes difficult to distinguish between *R. hirsuta* var. *cuprea* and *R. triflora*. The two species might perhaps be united under one species, as De la Roche did in Redouté's Liliacées (1809).

On account of the absence of anthocyanin the white-flowered specimens found near Stanford (*de Vos 2132* and *2141*) are placed with this species and not with *R. hirsuta*. These specimens differ from *R. sladenii* which also has white flowers, in the absence of anthocyanin on the backs of the outer perianth segments, in the filaments which are pilose at their bases, and in the corm with a somewhat narrower circular basal ridge on which the tunics split into a fringe of slender parallel fibrils.

23. **Romulea hirsuta** (Eckl. ex Klatt) Baker, J. Linn. Soc. 16: 89 (1877).

Plants 6—30 cm tall. *Corm* campanulate, 5—10 mm diam., flat at the base with a circular basal ridge; tunics hard, smooth, brown, mostly with an irregular fringe of fine parallel fibrils on the basal ridge, or sometimes irregularly lacerated, apical fibres 3—8 mm long. *Stem* short and hidden by leaf sheaths, or to 18 cm long and extending above-ground. *Basal sheaths* 1—2, 10—80 mm long. *Basal leaves* usually 2 or apparently more in short-stemmed forms, filiform, terete to compressed cylindrical, 5—30 cm long, 0,5—4 mm diam., suberect or bent, with a slender vein in each rib, minutely ciliate on the rib margins or glabrous, grooves narrow or sometimes wide, sheathing leaf bases 2—6 mm wide; *cauline leaves* 0—4, shorter than basal leaves, often with wider leaf sheaths. *Peduncles* 15—80 mm long, semiterete, glabrous or sometimes minutely ciliate on the sharp angles. *Bract* green, narrowly ovate, concave, 10—25 mm long, with slender, widely spaced veins, acute to obtuse. *Bracteole* green with narrow or wide, brown or white, membranous margins narrowing to a green, subacute to subobtuse tip. *Flowers* 1 to several, 20—45 mm long or rarely only 15 mm. *Perigone tube* 3—6 mm long, widely funnel-shaped or almost cup-shaped; *segments* narrowly obovate, the outer sometimes narrowly elliptical, 15—35 mm long, 5—12 mm wide, rarely wider, acute to obtuse or rarely emarginate, apricot-pink to dark old-rose, with a dark median vein, and with or without dark brownish-red blotches in the throat, or sometimes rosy-magenta with purplish-black blotches in the throat, the cup usually golden-yellow or orange-yellow, or sometimes very pale yellow; outer segments often reddish on the backs, sometimes with a pale median line. *Stamens* erect, golden-yellow or sometimes paler; *filaments* 4—8 mm long, pilose at the base and sometimes minutely pilose in the lower half; *anthers* 3—7 mm long, sometimes with dark lines of dehiscence. *Style* 8—16 mm long; *stigmas* 2—3 mm long, reaching the anther tips or slightly higher or lower. *Capsules* ellipsoid, ca. 10 mm long, on suberect or somewhat patent peduncles.

Type: Klatt (1865–66) cited *Bergius* s.n. from the Cape, and *Ecklon and Zeyher Irid. 207*, "im Gebirge bei der Capstad", in B, one of which should be chosen as lectotype. Neither of these specimens was obtainable from B for this investigation, and they were probably destroyed in the last war. Nor was any



FIG. 37.

R. hirsuta. All figures are of var. *hirsuta*, except fig. 6 & 11. 1, plant. 2, base of corm. 3, outer and inner perianth segments, lower surface (*de Vos* no. *1098* from Stellenbosch). 4, outer and inner segments, upper surface (*de Vos 1565*, from Darling). 5, outer and inner segments, upper surface (*de Vos 1098*). 6, var. *cuprea*, outer and inner segments (*de Vos 2120* from Worcester). 7, outer and inner segments, lower surface (*de Vos 1692* from Koelenhof). 8, same, upper surface. 9, pistil, stamens, and perianth tube. 10, transverse section of leaf. 11, var. *zeyheri*, transverse section of leaf.

Bergius specimen found in SBT. *Ecklon & Zeyher 207* in SAM is from Somerset West and is therefore not of the same collection as Klatt's citation. A neotype must serve in the meantime until one of the original collections or an isotype is discovered. One of the two sheets of *Ecklon 703* in S, dated Sept. 20, 1826, is selected, with isotypes in PRE, B, G, K, M, Z, etc. This is probably part of Ecklon's original collection (1827) and is also one of Baker's citations (1896).

This widely distributed species is very variable, ranging in height from only a few centimetres in the Cape Peninsula and Caledon, to about 30 cm in the Malmesbury and Hopefield districts. The larger specimens, which also have somewhat larger flowers and bracts, longer and thicker stems and wider leaves, often with wide grooves, have previously been described as a distinct species. But with the discovery of more specimens, separate species for these longer variants cannot be upheld, as there is an intergrading series connecting the typical *R. hirsuta* and the larger specimens. They are therefore treated as a variety of *R. hirsuta*. Possibly they represent a geographic race occurring near Darling and towards Saldanha Bay.

R. hirsuta is readily distinguishable by its symmetrical corm, with flat base and a fringe of fine, more or less parallel fibrils on a circular basal ridge, and green bract and bracteole, the latter with wide, more or less colourless membranous margins, but with a green tip. Variation in the colour of the flowers occurs in several areas, and the colour variants probably represent geographical races. Pale apricot-coloured variants, with no dark blotches in the throat, are found from Ceres to the Cape, and towards Franschhoek and Caledon. North of Stellenbosch, near Koelenhof and Bottelary, and towards Fisantekraal, and also on Lion's Head, occurs a form with a rosy-magenta perianth and dark purple or purplish-black blotches in the throat, and very little yellow in the cup. Most of the above-mentioned variants are treated as separate varieties.

The leaves vary from sparsely and minutely ciliate on the margins of the leaf ribs to glabrescent or glabrous. This variation often occurs in single collections, and sometimes even in single specimens, older leaves being glabrous and younger ones ciliate, or the upper parts of leaves being glabrous and the younger, lower parts ciliate.

R. hirsuta is closely allied to *R. gracillima*, *R. sladenii*, *R. tortilis* and *R. triflora* and probably intergrades with *R. triflora*. These species may perhaps be united into one large polymorphic or aggregate species, but, as they are usually readily distinguishable, they are treated as separate species. Unfortunately hardly any interfertility tests could be made between these species, as they did not survive long in the experimental garden. The shape of the corm prevents its being drawn readily to the correct depth into the ground by the contractile root.

KEY TO THE VARIETIES

1 Perigone without dark blotches in the throat, cup yellow or orange.
 2 Flowers salmon or "copper" in upper part. c. Var. *cuprea*
 2 Flowers pink in upper part a. Var. *hirsuta*
1 Perigone with dark blotches in the throat, cup yellow, orange or purplish.
 3 Limbs of perigone segments with a wide, dark, median blotch, segments generally less than 12 mm wide.
 4 Terete part of widest leaves ca. 1 mm in diam. a. Var. *hirsuta*
 4 Terete part of widest leaves 1,5—4 mm diam., rarely less . . . b. Var. *zeyheri*
 3 Limbs of perigone segments with a narrow, dark, median blotch and lateral cream blotches, segments generally 12—20 mm wide d. Var. *franesii*

a. Var. **hirsuta**

R. hirsuta (Eckl. ex Klatt) Baker, J. Linn. Soc. 16: 89 (1877) et 1892 p. 102 et 1896 p. 40; Ecklon 1827 p. 19 nom. nud.; Klatt 1882 p. 398 et 1895 p. 165; Béguinot 1907b p. 108 et p. 473 et 1909 p. 88; Lewis 1950 p. 221.

?*Ixia campanulata* Lamarck 1791 p. 109: non Houttyn 1774–83. *Ixia filifolia* F. De la Roche var. B, 1809 t. 251 fig. 2; Poiret 1813 p. 201 pro parte.

Trichonema hirsutum Steud. ex Klatt 1865–66 p. 665; Steudel 1840 p. 702 nom. nud. *T. ramosum* Steudel 1840 p. 702 nom. nud.

R. ramosa Ecklon 1827 p. 19 nom. nud. *R. uncinata* Klatt 1882 p. 401 et 1895 p. 167—holotype: *Pappe* s.n. (S); Baker 1892 p. 102 pro syn. et 1896 p. 40 pro syn. *R. rubrolutea* Baker 1906 p. 25—only syntype seen: *Penther 678* (K).

Geissorhiza sublutea auct. non Ker: Baker 1896 p. 41 pro syn. et Béguinot 1909 p. 88 pro syn.

Icones: Rice & Compton 1950 Pl. 186 fig. 2; Kidd 1950 Pl. 47 fig. 7, sub *R. rosea* Eckl. var. *speciosa* Bkr.; this work Fig. 30, 37.

Stem short or up to 90 mm long and shortly extending. *Leaves* filiform, ca. 1 mm diam., minutely ciliate on the rib margins or glabrous, grooves narrow or sometimes somewhat widened. *Peduncles* glabrous or minutely ciliate on the sharp angles. *Bracteole* with brown or brown-edged membranous margins. *Flowers* 20—40 mm long. *Perigone segments* mostly 6—10 mm wide, rarely only 5 mm, dark rosy-pink (RHS 48BC) or apricot-pink (RHS 41D) with dark brownish-red blotches in throat, or sometimes rosy-magenta with dark violet blotches, cup golden or orange-yellow or with very little yellow. *Capsules* on suberect peduncles. *Chromosome number* 2n = 24 (*de Vos 1692, 5/35*).

CLANWILLIAM. *Penther 678* sub *R. rubrolutea* (K). Near Clanwilliam: *Leipoldt 4165* (BOL). Modderfontein: *Gillett 3669* sub *R. sublutea* (BOL). Kardouw: *Compton 24336* (NBG). Olifants River valley: *Leipoldt* 29 Aug. 1931 (BOL).

PIKETBERG. Foot of Piketberg: *Schlechter 5223* (BOL, GRA, PRE, G, K). Piketberg: *Gillett 3645* (BOL), *Hall 155* (NBG). Head of Kapteinskloof: *Pillans 7708* (BOL). Hill near The Rest: *de Vos 1621*. Near Porterville on road to Tulbagh: *Wilman 717* (BOL). Grey's Pass: *Salter 1365* (BOL). Porterville: *Steyn 587, Loubser 974* (NBG).

TULBAGH. Roadside between Saron and Tulbagh: *L. Bolus BOL 17022*. Artois: *Esterhuysen 6082* (BOL).

CERES. Close to town: *Marloth 10355* (STE). Gydouw: *Leipoldt 4077* (BOL). Karoopoort: *Leipoldt BOL 21264* partly.

WORCESTER. Stettyn: *Leipoldt 3545* (BOL). Brandvlei: *Marsh 889* (STE).

HOPEFIELD. *Zeyher*(?) s.n. ex hb. Gub. 1905 (GRA).

VREDENBURG. Near Vredenburg: *Lewis 1056* (SAM). Between Vredenburg and Saldanha: *Pamphlet 65* (NBG).

MALMESBURY. Near Darling: *Bolus*, Sept. 1905 (BOL), *Leipoldt*, Sept. 1931 (BOL). North of Darling: *Hutchinson 232* (PRE). Between Darling and Ysterfontein: *de Vos 1565*. Near 20th mile on Darling road: *Acocks 2153* partly (S). Near Mamre: *Davis SAM 60704*. Kalbaskraal: *Garabedian SAM 50377*. Between Soutrivier and Kalbaskraal: *Hutchinson 176* (K). Road to Melkbosch: *L. Bolus 24353* (BOL).

BELLVILLE. Near Fisantekraal: *de Vos 1768*. Near Hercules Pillar, Durbanville: *Mathews NBG 1418/30* (BOL).

CAPE. Lion's Rump: *Ecklon 703*; Devil's Peak: *Ecklon 703*, *MacOwan HNAA 254* (BOL, SAM, G, K, GH), *Ecklon PRE 11153*. Table Mountain: *Tyson 2454* (GRA, K). Lion's Head: *Pappe SAM 20699*; *Schlechter 1047* (GRA, Z, partly in P), *Esterhuysen 15759* (BOL). Signal Hill: *Marloth 5626* partly (PRE), *Salter 8248* (BOL, SAM). Foot of Lion's Head near Sea Point: *MacOwan 2565* (SAM, K). Sea Point: *MacOwan HNAA 529* (BOL, SAM, GRA, G, K, cited in Fl. Cap.); *MacOwan 2616* (S). Green Point: *Zeyher 5007* (SAM, K); *Pappe SAM 20696*; *Tyson 1881* partly (PRE). Kloofnek: *Marloth 5539* (PRE). Near Cape Town: *Wilms 3718* (G). Camp Ground near Cape Town: *Bolus 4596* (BOL). Flats near Rondebosch: *Dod 1465* (BOL, K); *Rehmann 1735* (Z). Flats beyond Uitvlugt: *Dod 1338* (BOL). Rietvallei: *Zeyher SAM 20702*. *Ecklon*(?) local. 84 (GRA). Campground: *Zeyher 5020* (SAM). Rapenberg golf links: *Salter* 7455 (SAM). Ndabeni: *Salter 8677* (BOL). Fish Hoek flats: *Salter 7411* (SAM). Beyond Simonstown: *Dod 565A* (BOL, K).

PAARL. Near Paarl: *Drège 8450a* (K); *Salter 1325* (BOL). Flats N of Paarl: *Leighton 2003* (BOL). Agter Paarl: *Salter 3581* (BOL, K), *Barker 436* (NBG). Foot of Du Toitskloof: *Hall* s.n. (NBG).

WELLINGTON. Near Wellington: *L. Bolus 20834* (EOL, PRE), *Barker 437* (NEG).

STELLENBOSCH. *Duthie 621* (BOL), *Garside 1065* (K), *Smith 3323* (PRE). Stellenbosch flats: *de Vos 1098*. Near Stellenbosch: *Acocks 2152* (S), *L. Bolus BOL 21260*. Near Koelenhof: *de Vos 1692*, *Acocks 4926* (S). Kanonkop: *de Vos 1639*. S slopes of Vlaberg: *Dod 1645* (ECL). Faure: *Strey 573* (PRE). Lynedoch: *Barker 1800* (NEG).

SOMERSET WEST—STRAND. *Compton 13462* (NBG). Hottentots Holland: *Ecklon & Zeyher 207* (SAM), *Ecklon* sub *R. ramosa* and *Trich. speciosum* (S), *Verreaux* s.n. (G). Near Sir Lowry's Pass: *Schlechter 1116* (GRA, Z). Sir Lowry's Pass: *Stokoe SAM 58713*. Somerset West: *Leighton 247* (BOL). Van der Stel: *Smith 3203* (PRE). Between Strand and Gordon's Bay: *Esterhuysen 23128* (BOL).

CALEDON. Near Bot River: *MacOwan HNAA 256* (partly in G, not in BOL or SAM). Highlands: *Compton 13479* (BOL, NBG), *Leighton 246* (BOL).

BREDASDORP. Near Elim: *de Vos 2048*.

WITHOUT LOCALITY. Ex Hb. *Zeyheri*, sub *Geissorhiza sublutea* Ker (K). *Sieber* sub *G. sublutea* (S). *Burchell*, sub *Trichonema*? (K). *Burman* sub *R. uncinata* (G). *Bowie 398*, *399* (G). *Elliot* (G). *Bachmann 1578* (Z). *Drège 8450a* (BM, G, K, L, OXF, P, CGE). *Schlechter 4982*, *5223* (Z). *Wilms 3718* (P). *Breutel* sub *R. speciosa* (G).

Flowering period August to September. In sandy soil up to 900 metres altitude.

b. Var. **zeyheri** (Bkr.) De Vos comb. nov.

R. rosea Eckl. var. *zeyheri* Baker, Handb. Irid. 103 (1892) *R. zeyheri* (Bkr.) Béguinot 1907a p. 338 et 1907b p. 476 et 1909 p. 105—only syntype seen: Hb. *Zeyher 565* (B): non Ecklon 1827 p. 19 nom. nud. *R. bulbocodioides* Bkr. var. *ambigua* Béguinot 1908a p. 163 et 1909 p. 110—type *Drège Irid. 208* (G). *R. klattii* Béguinot 1907a p. 333 et 1907b p. 110 et p. 474 et 1909 p. 92—syntypes: *Bachmann 1579* (B, Z), *Bachmann 513* (B).

Geissorhiza zeyheri Spr. nom. nud. in herb.; Klatt 1865–66 p. 664 pro syn.; Baker 1896 p. 42 pro syn.; Béguinot 1907a p. 338 et 1909 p. 105 pro syn.

Trichonema speciosum auct. non Ker: Klatt 1865–66 p. 664 excl. aliquot syn.

Stem usually extending above-ground, up to 180 mm long, often branched near the top, or sometimes short and hidden by leaf bases. *Leaves* subterete to compressed cylindrical, widest leaves 1,5—4 mm diam. or rarely less, glabrous or sometimes minutely ciliate on margins of ribs, grooves wide. *Peduncles* glabrous or glabrescent. *Bracteole* with wide white membranous margins. *Flowers* 30—45 mm long. *Perigone segments* 8—12 mm wide, dark rosy-pink (RHS 48B, C) or dark apricot-pink, mostly with dark brownish-red blotches in throat and a golden or orange-yellow cup or sometimes with hardly any yellow in the cup. *Capsules* on suberect peduncles. *Chromosome number* 2n = 24 (*de Vos 2016*).

Type: Baker (1892) did not cite any type, but his varietal epithet *zeyheri* is undoubtedly based on a collection in K labelled *Geissorhiza zeyheri* Spr. and *R. rosea* var., ex hb. Zeyheri (s.n.). This then is regarded as holotype.

VREDENBURG. Saldanha Bay: *Ecklon(?) 208* (S). Near Saldanha: *de Vos 2016*. Vredenburg granite rocks: *Lewis 5981* (NEG).

HOPEFIELD. Near Hopefield: *Bachmann 1579* (B, Z). Near Langebaan: *Salter 3007* (BOL, partly in K), *Lewis NBG 2024/32* partly (ECL). Abbots Farm, Langebaan: *Barker 10399* (NBG). Postberg: *Lewis* s.n. (NEG). Near Stony Head: *Barker 10468* (NEG).

MALMESBURY. Darling: *Bachmann 513* (B). Between Mamre and Ysterfontein: *Davis SAM 61062*.

PAARL. Along Bergrivier: *Drège 8450a* (S partly).

WITHOUT LOCALITY. Ex hb. Zeyheri sub *Geissorhiza zeyheri* Spr. (K). Ex hb. *Zeyher 565* sub *G. zeyheri* Spr. (B). *Drège Irid 208* sub *R. bulbocodioides* Bkr. var. *ambigua* Beg. (G)

Flowering period August.

In sandy soil at low altitudes.

Several intermediates have been found between this variety and the typical variety, e.g. *Bolus* s.n. Sept. 1905 and *Lewis NBG 2024/32*, the latter with smaller specimens which are the typical variety and larger specimens which are of this variety. Béguinot's treatment of this group as a distinct species is therefore not upheld. Baker, on the other hand, treated this entity as a variety of *R. rosea* Eckl., but its campanulate corm and frequently elongated stem show conclusively that this decision is not justified either.

Two collections of this variety from Zeyher's herbarium, the one s.n. in K and the other no. *565* in B, were misidentified as *Geissorhiza zeyheri* Spr. which is a nomen nudum.

Ecklon's material of *R. zeyheri* Eckl. (1827), a nomen nudum, was seen in S and proved to be a Geissorhiza. *R. zeyheri* Eckl. is therefore not a synonym of *R. zeyheri* Beg. (1907a, 1909), as Béguinot stated.

c. Var. **cuprea** (Beg.) De Vos comb. nov.

R. rosea Eckl. var. *cuprea* (Bkr.) Béguinot 1909 p. 63. *R. cuprea* W. Herb. ex Baker 1876 p. 236 et 1877 p. 89 et 1892 p. 104 et 1896 p. 42; Klatt 1882 p. 402 et 1895 p. 164.

Trichonema cupreum Herb. MS. nom. nud.

Bulbocodium cupreum (Bkr.) Kuntze 1891 p. 700.

Icon: Herbert MS tab. in Lindley Library, Roy. Hort. Soc., London.

Stem short or to 100 mm long or sometimes even longer. *Leaves* filiform, 0,5—1,3 mm diam., glabrous or glabrescent or rarely minutely ciliate on margins of ribs, grooves narrow or slightly widened. *Peduncles* glabrous. *Bracteole* with white membranous margins. *Flowers* 20—30 mm or to 40 mm long. *Perigone segments* mostly 5—8 mm wide, rarely 10 mm or only 4 mm, apricot-pink (RHS 29C, D), without dark blotches in the throat, the cup yellow, the outer segments sometimes darker salmon-pink on the backs. *Capsules* mostly on somewhat patent peduncles. *Chromosome number* 2n = 24 (*de Vos 1775*, *1913*).

Holotype: *Herbert* MS. tab. in Lindley Library, Roy. Hort. Soc., London.

CLANWILLIAM. Modderfontein: *Gillett 3669* (BOL). Olifants River: *Schlechter 4982* (BOL, PRE, GRA, G, K, S).
CERES. Two mls. E of Ceres: *de Vos 1679*.
WORCESTER. *Leipoldt* Aug. 1926 (BOL). Flats Rawsonville-Du Toitskloof: *de Vos 2120*.
PAARL. Top of Franschhoek Pass: *de Vos 1775*. Bien Donne: *Conradie STE 30222*. Wemmershoek: *Isaacs* Aug. 1937 (BOL). W slopes of Klein Drakenstein: *Salter 4663* (BOL, K).
CAPE. Cape Flats near Claremont: *H. Bolus 3760* partly (BOL, PRE).
SOMERSET WEST. Top of Sir Lowry's Pass: *de Vos 1913*.
CALEDON. Between Franschhoek Pass and Villiersdorp: *de Vos 1776*. Kraalfontein, between Elgin and Highlands: *Leighton 245* (BOL).
HERMANUS. E of Hermanus and Stanford: *de Vos 2045*.
BREDASDORP. Elim: *Frowein Hb. Tvl. Mus. 16293* (PRE).
WITHOUT LOCALITY. *Breutel* pl. Afr. austr. Ed. Hohenarkel. *Martin NBG 1228/37* (BOL).

Flowering period August to September.

Béguinot's treatment of this variety as a variety of *R. rosea* cannot be upheld, as Herbert's drawing of it, which is the type, shows an elongated stem with a cauline leaf.

This variety, with its pale apricot-coloured flowers without dark blotches on the limbs, connects *R. hirsuta* with *R. triflora*. Certain herbarium collections, e.g. *Barnard* (Sept. 1932), *Leipoldt* (Aug. 1931), *Schlechter 4982*, and *Martin NBG 1227/37* (BOL), in which the apricot colouring may have faded, can hardly be separated from *R. triflora*. *De Vos 1882*, from the northern side of Bainskloof, contained yellow and pale apricot-coloured specimens. As the apricot colour no longer shows in the dried specimens of this collection, it is cited under *R. triflora*. *Bolus 3760*, with apricot-coloured and yellow flowers, is cited here (cited by Baker as *R. hirsuta*).

One of the specimens in the *de Vos 1634* collection from Bien Donne,

Paarl, has a flower with dark blotches in the throat as in var. *hirsuta*, and is similar to the apricot-pink specimens with dark blotches in the throat, from the Stellenbosch flats (e.g. *de Vos 1098*), cited under the typical variety. This collection connects the typical variety and var. *cuprea*.

d. Var. **framesii** (L. Bolus) De Vos stat. nov.

R. framesii L. Bolus, J. Bot. 69: 13 (1931).

Stem usually extending above-ground, up to 140 mm long, to 2 mm diam., with one to several short internodes near top. *Leaves* subterete to compressed cylindrical, 1—2 mm diam., sometimes minutely ciliolate on margins of ribs, grooves wide or narrow. *Peduncles* glabrous. *Bracteole* sometimes slightly shorter than bract, with brown-edged membranous margins. *Flowers* 30—50 mm long. *Perigone segments* mostly 12—20 mm wide or sometimes less, obovate or subrhomboid-cuneate to narrowly obovate-cuneate, dark old-rose with 3 subequal blotches or the median black-purple blotch a little wider than the white lateral ones (sec. Bolus) on each limb, outer segments irregularly marked with pink and light green on backs.

Holotype: *Ross Frames BOL 18993* in Bol. Isotype in K.

MALMESBURY. Near Darling: *Ross Frames BOL 18993*. Darling: *Penberthy NBG 2832/35*. Between Darling and Ysierfontein: *L. Bolus BOL 20721* (BOL, K).

Flowering period September to October.

The specimens in the Bolus herbarium differ from the other varieties of *R. hirsuta* in the markings on the perianth and the wider perianth segments. The width of the segments, however, is variable; specimens in the herbarium in Kew show narrower segments, which connect this variety with the typical variety. For this reason a distinct species for this group has not been upheld.

24. **Romulea tortilis** Baker, Bull. Herb. Boiss. 2 Ser. 4: 1003 (1904).

Plants 6—12 cm tall. *Corm* campanulate, 5—8 mm diam., flat at the base with a wide circular basal ridge; *tunics* hard, smooth, brown, with minute parallel fibrils or irregular scales on the basal ridge, apical fibres 7—15 mm long. *Stem* short and hidden by the leaf sheaths, or to 25 mm long and shortly extending above-ground. *Basal sheath* 1, 10—12 mm long. *Basal leaves* usually 2, or seemingly more in short stem forms, filiform, more or less spirally twisted, 5—12 cm long in the twisted state, 0,5—1 mm diam., with a slender vein in each rib, grooves wide or narrow, glabrous or sometimes minutely ciliolate on the margins of the ribs, sheathing leaf bases narrow; *cauline leaves* 0—2, usually shorter than the basal leaves and with 2—4 mm wide leaf sheaths. *Peduncles* 15—40 mm long, semiterete. *Bract* green, narrowly ovate, 10—20 mm long, acute to subobtuse. *Bracteole* green with wide brown or brown-edged membranous margins narrowing to a green tip. *Flowers* 1—2, 20—30 mm long.

Perigone tube 3—4 mm long, funnel-shaped; *segments* narrowly elliptical or narrowly obovate-elliptical, 15—25 mm long, 5—9 mm wide, obtuse, reddish or dark old-rose, with dark red or purple blotches in the throat and a golden-yellow cup, or with a magenta or reddish-purple perigone with hardly any yellow in the cup. *Stamens* erect; *filaments* 5—6 mm long, pilose near the base; *anthers* 3,5—5 mm long, golden-yellow. *Style* 10—12 mm long, style branches sometimes repeatedly branched and with more than 6 stigmas, reaching the anther tips or slightly higher.

Holotype: *Schlechter 4890* in Z; isotypes in BOL, GRA, PRE, SAM, B, G and partly in K.

Flowering period July to September.

This species is closely allied to *R. hirsuta* differing from the latter in its spirally twisted leaves.

As in *R. hirsuta*, variation occurs in the colouring of the perianth. Plants with a darker, magenta perianth and hardly any yellow in the throat, a repeatedly branched style, and more than six stigmas are placed in a distinct variety.

a. Var. **tortilis**

R. tortilis Baker 1904 p. 1003; Béguinot 1907b p. 111 et p. 474 et 1909 p. 95. *R. torta* Baker 1906 p. 24—syntypes: *Penther 687* (BOL, K, etc.), *624*.

R. flexifolia auct. non Jord.: Schlechter nom nud in Hb.

Flowers dark old-rose or reddish with dark red or purple blotches in the throat and a golden-yellow cup. Style with 3 bifid branches and 6 stigmas.

CLANWILLIAM. Olifants River: *Penther 687* (BOL, BM, K, M).
PIKETBERG. Near Porterville: *Schlechter 4890*, *Schlechter 10735* (BOL, GRA, PRE, K, G, S, US).

b. Var. **dissecta** De Vos var. nov.

A typica perigonio magenteo vel e rubro purpureo, basi aegre luteo, stylo identidem dissecto, stigmatibus plus quam 6, differt.

Flowers magenta or reddish-purple with very little yellow in the cup. *Style* branched repeatedly, with more than 6 stigmas.

Holotype: *L. Bolus BOL 21265* in BOL.

CLANWILLIAM. Hill near The Rest: *L. Bolus BOL 21265*. Between Knechtsvlakte and Sandveld: *Leipoldt 3824* (BOL).
PIKETBERG. The Rest: *Gillett 3713* (BOL), *L. Bolus BOL 23190*.

25. **Romulea gracillima** Baker, Handb. Irid. 103 (1892), et 1896 p. 41; Béguinot, 1909 p. 73.

Trichonema cruciatum Ker, *a*, in herb.: non Ker 1801, 1805, 1827.

Fig. 33, 38.

Plants 6—25 cm tall. *Corm* campanulate, 4—6 mm diam., flat at base with a circular basal ridge; tunics hard, smooth, brown, with a fringe of minute

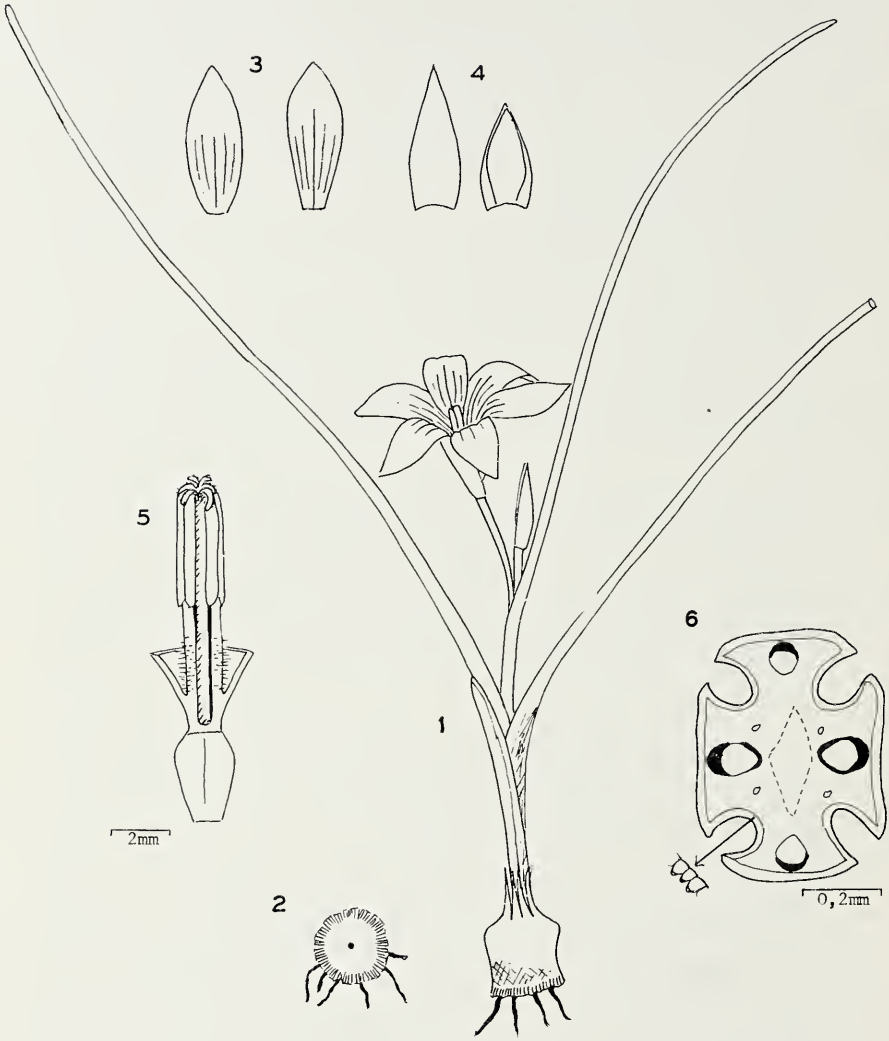


FIG. 38.

R. gracillima (*de Vos* no. *2138*). 1, plant ×1. 2, base of corm. 3, outer and inner perianth segments. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, transverse section of leaf.

parallel fibrils on basal ridge, apical fibrils 3—5 mm long. *Stem* short and hidden or to 100 mm long and shortly extending above-ground. *Basal sheath* 1, 10—20 mm long. *Basal leaves* 2—4, filiform, flaccid, 6—25 cm long, mostly less than 1 mm diam., glabrous, grooves very narrow, sheathing leaf bases to 3 mm wide; *cauline leaves* 1—2 in long-stemmed forms. *Peduncles* 15—80 mm long or sometimes longer, semiterete, glabrous. *Bract* green, ovate, concave, 7—15 mm long. *Bracteole* green with narrow colourless membranous margins narrowing to a green tip. *Flowers* 1—2, 15—25 mm long. *Perigone tube* ca. 3 mm long, funnel-shaped; *segments* narrowly elliptical, 12—18 mm long, 3—6 mm wide, obtuse to acute, pale pink (RHS 68C, 69B, 75B), sometimes with narrow red lines in the throat, with a yellow cup, outer segments deeper pink or reddish on the backs. *Stamens* erect, yellow; *filaments* 3—5 mm long, pilose at the base and shortly pilose in the lower half or almost to the tips; *anthers* 2—4 mm long. *Style* 7—8 mm long; *stigmas* at the anther tips. *Capsules* ellipsoid, 6—8 mm long, on peduncles which remain suberect after flowering. *Chromosome number* 2n = 24 (*de Vos 2138*).

Holotype: *Drege* s.n. sub *Trichonema cruciatum* Ker, *a*, in K. Isotypes in BM, G, OXF, P.

CAPE. Skoorsteenkop, Hout Bay: *Acocks 5271* (S).
PAARL. Drakenstein Mts.: *Drège* s.n. sub *Trichonema cruciatum* Ker, *a*.
STELLENBOSCH. Swartboskloof, Jonkershoek: *Kerfoot 5374* (Herb. Jonkershoek Forest Reserve); *Lewis 1664* (SAM). On Victoria Peak: *Esterhuysen 17582* (BOL).
CALEDON. Top of Sir Lowry's Pass: *de Vos 2138*. Sir Lowry's Pass: *Esterhuysen 32181* (BOL). Houwhoek Pass: *de Vos 1976*.
BREDASDORP. The Poort: *Barker 2522* (NBG).
WITHOUT LOCALITY. *Drège* sub *Trichonema cruciatum* Ker, *a*, (OXF).

Flowering period September.

This species, found on several of the mountain ranges of the Western Cape Province, is closely allied to *R. hirsuta* and might perhaps be a smaller variety of the latter species. As it is readily distinguishable from *R. hirsuta* by its smaller flowers and more slender habit, pale pink perianth and narrower perianth segments, and as no experimental data are as yet available on the interfertility between these two species, it is maintained as a distinct species.

26. **Romulea sladenii** De Vos sp. nov.

Fig. 31, 39.

Cormus campanulatus 5—10 mm diam. basi planus, crista basilari lata prominenti circulari 7—15 mm diam., tunicis rigidis laevibus brunneis, fibrillis cristae basilaris irregulariter aggregatis, apice fibris 3—5 mm longis praedito. *Caulis* brevis vel ad 200 mm longus et supra terram exsertus. *Vagina basilaris* 1. *Folia basilaria* 2 vel apparenter plura in plantis brevicaulibus, filiformia 6—30 cm longa vulgo minus quam 1 mm diam., glabra, sulcis angustis, basibus vaginantibus perangustis; *folia caulina* 1—3 breviora quam folia basilaria, basibus ad



FIG. 39.

R. sladenii (*de Vos* no. *2018*). 1, plant × 1. 2, base of corm. 3, outer and inner perianth segments. 4, bract and bracteole × 1. 5, pistil, stamens, and perianth tube. 6, almost mature capsules × 1. 7, transverse section of leaf.

3 mm latis. *Pedunculi* 15—50 mm longi semiteretes glabri. *Bractea* viridis, marginibus perangustis aegre manifestis, anguste ovata 9—18 mm longa tenuinervis emarginata vel acuta. *Bracteola* viridis in medio, marginibus membranaceis latis brunneo-marginatis vel fere incoloratis, apice viridi. *Flores* 1—3 vel plures, 22—33 mm longi. *Tubus* perigonii 4—5 mm longus late infundibuliformis; *segmenta* 15—25 mm longa, 4—9 mm lata subobtusa vel subacuta alba, basi aurea, segmenta exteriora anguste elliptica a dorso rubella vel e purpureo rubra vel aliquando subviridia, segmenta interiora anguste obovata. *Stamina* erecta prope basin perigonii inserta; *filamenta* 5—7 mm longa in dimidio inferiore minute pilosa, aurantiaca; *antherae* 4—6 mm longae flavae. *Stylus* ca. 13 mm longus; *stigmata* apices antherarum attingentia. *Capsulae* 8—10 mm longae ellipsoideae in pedunculis patentissimis.

Holotype: *de Vos 2018* in STE.

Plants 7—30 cm tall. *Corm* campanulate, 5—10 mm diam., flat at the base, with a pronounced, wide circular basal ridge 7—15 mm diam.; tunics hard, smooth, brown, irregularly lacerated on the basal ridge into irregular fibril groups, apical fibres 3—5 mm long. *Stem* short or to 200 mm long and extending above-ground. *Basal sheath* 1, 15—45 mm long. *Basal leaves* 2 or apparently more in short-stemmed forms, filiform, 6—60 cm long, mostly less than 1 mm diam., glabrous, with a slender vein in each rib, grooves narrow, sheathing leaf bases very narrow; *cauline leaves* 1—3, shorter than the basal leaves and with sheaths to 3 mm wide. *Peduncles* 15—50 mm long, semiterete, glabrous. *Bract* green, narrowly ovate, 9—18 mm long, with slender veins, emarginate or acute. *Bracteole* green in the centre with wide, almost colourless or brown-edge membranous margins, narrowing to a green tip. *Flowers* 1—3 or more, 22—33 mm long. *Perigone tube* 4—5 mm long, widely funnel-shaped; *segments* 15—25 mm long, 4—9 mm wide, subobtuse to subacute, white, cup bright yellow; outer segments narrowly elliptical, reddish, purplish-red or sometimes greenish on the backs, inner segments narrowly obovate. *Stamens* erect; *filaments* 5—7 mm long, minutely pilose in the lower half, orange-yellow; *anthers* 4—6 mm long, pale yellow. *Style* ca. 13 mm long; *stigmas* at anther tips. *Capsules* usually 2, ellipsoid, ca. 8—10 mm long, on peduncles widely patent from their bases. Chromosome number 2n = ca 24 (*de Vos 2018*).

VANRHYNSDORP. Gifberge: *Phillips, Sladen Mem. Exp. 7506* (BOL, SAM, K), *Compton 20846* (NBG). Plateau on the Matsikamma: *de Vos 2018*.

Flowering period August to September.

This rare mountain species has apparently a very local distribution on the plateau of the Gifberge at ca. 700 m altitude, where it is very common on the sandy soil of Table Mountain Sandstone.

The species is readily recognised by its corm with flat base and lacerated,

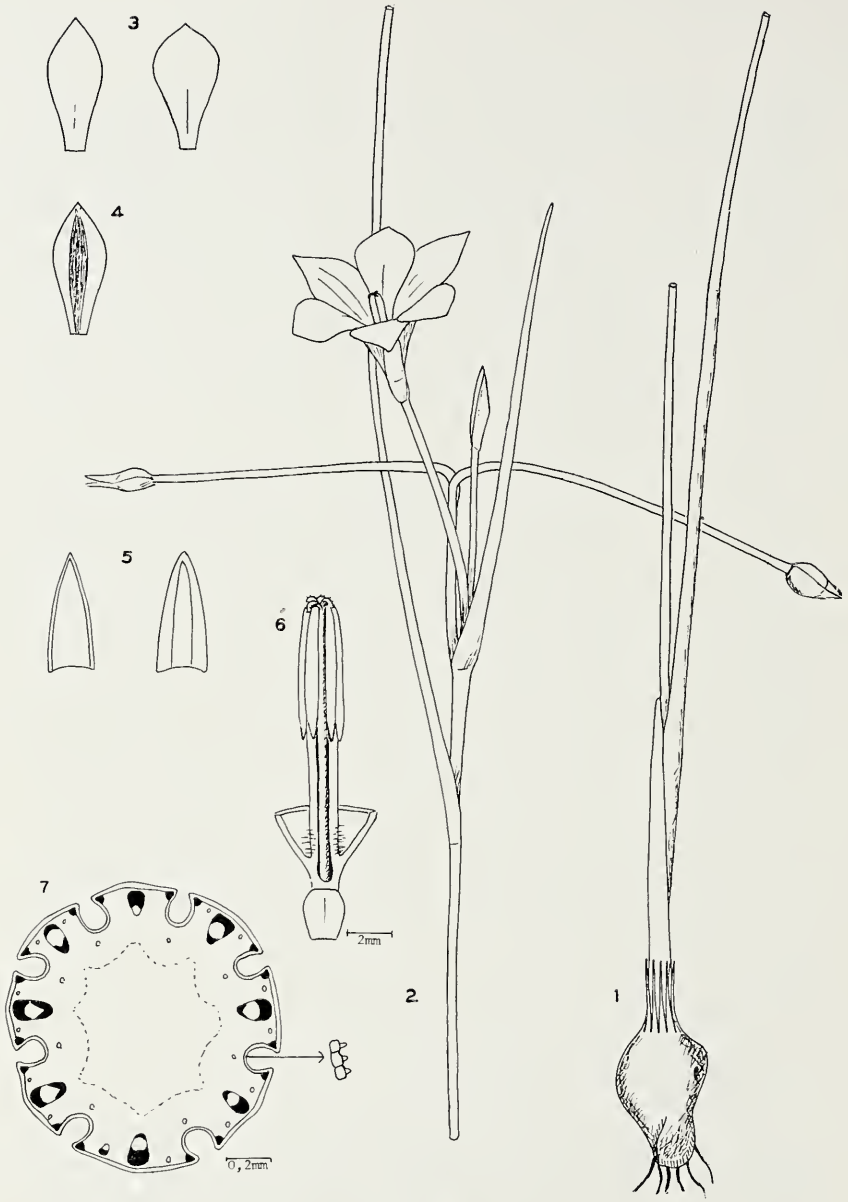


FIG. 40.

R. multisulcata (*de Vos* no. *2183*). 1, 2, plant $\times \frac{3}{8}$. 3, outer and inner perianth segments, upp surface. 4, outer segment, lower surface. 5, bract and bracteole $\times 1$. 6, pistil, stam ns, an perianth tube. 7, transverse section of leaf.

circular basal ridge, which is much wider than the corm, white flowers with the outer segments mostly reddish or purplish on the backs, and widely patent peduncles in the fruiting stage. It differs from the allied *R. hirsuta* and *R. triflora* in the above-mentioned characteristics, and also in its filaments, which are minutely pilose in the lower half but are without a basal tuft of hairs. It is also readily distinguished from the white-flowered form of *R. triflora* by its outer perianth segments which are generally reddish or purplish on the backs.

In some herbaria the *Phillips* collection was misidentified as *R. elegans* Klatt, or as *R. sublutea* Bkr.

1.3 Subsection Aquaticae De Vos subsect. nov.

Plantae aquaticae, in lacunis temporariis crescentes, caule et foliis supra aquam productis. *Cormus* basi crista lunata praeditus. *Caulis* elongatus. *Folia* basilaria 1 vel 2, filiformia erecta 5—8-sulcata. *Flores* magni lutei vel albi. *Segmenta interiora perigonii* spatulata, interdum apiculata. *Capsulae* subglobosae vel lobis tribus rotundatis.

Type species: *R. aquatica* Lewis.

Plants aquatic with stem and leaves extending above the water level. *Corm* with a crescent-shaped basal ridge with parallel fibrils, embedded in the muddy or clayey bottom of a seasonal pool. *Stem* elongated. *Basal leaves* 1 or 2, erect, terete, with 5—8 narrow grooves; *cauline leaves* few, much shorter than the basal leaves. *Flowers* large, white with a yellow cup, or yellow. *Inner perigone segments* spatulate, sometimes apiculate, slightly wider than the outer. *Capsules* subglobose or 3-lobbed, with seeds large for the genus.

Leaf anatomy. Upper unifacial part long, 5—8-grooved and 5—8-ribbed; each rib with a large and two small vascular bundles. Rib margins glabrous, with subepidermal fibre bundles. Epidermal cells in the grooves with high papillae.

The two species of this subsection are allied, resembling each other in their aquatic habit and erect leaves with more than four stomatiferous grooves. In this they differ from all other Romulea species. The change to an aquatic habitat seems to have necessitated the formation of more grooves in the leaves, possibly to increase the transpiration rate. Of the two species *R. multisulcata* is the least specialised.

27. **Romulea multisulcata** De Vos sp. nov.
Fig. 40.

Planta aquatica. *Cormus* 6—15 mm diam., basi oblique complanatus crista lunata alta ciliata, tunicis rigidis laevibus brunneis, apice fibris ca. 5 mm longis praedito. *Caulis* 6—22 cm longus erectus, supra aquam exsertus, internodio

summo ca. 20 mm longo. *Vaginae basilares* 1—2. *Folia basilaria* 2, teretia erecta 30—50 cm longa 1—2 mm diam., 6—8-sulcata, sulcis angustis, folium secundum basi vaginanti 10—20 cm longa amplexicauli; *folia caulina* 1—2, folium primum 4—7 cm longum, secundum brevius membranaceum. *Pedunculi* semiteretes 30—70 mm longi. *Bractea* subviridis vel e rubro viridis, marginibus membranaceis angustis, fere anguste triangularis 12—18 mm longa, dense nervata subacuta. *Bracteola* viridis in medio, marginibus membranaceis latis incoloratis vel brunnescentibus, subacuta vel obtusa. *Flores* 2—4, 25—32 mm longi. *Tubus perigonii* 3—5 mm longus infundibuliformis; *segmenta* 15—25 mm longa lutea, segmenta exteriora ca. 7 mm lata anguste obovata subacuta, a dorso in medio brunneo-marmorata, segmenta interiora fere spatulata ca. 9 mm lata paulo breviora quam exteriora, saepe apiculata. *Stamina* erecta prope basin perigonii inserta, lutea; *filamenta* 4—6 mm longa basi pilosa; *antherae* 6—8 mm longae. *Ovarium* 2—3 mm longum subglobosum; *stylus* 12—15 mm longus, *stigmatibus* apices antherarum attingentibus vel paulo superioribus. *Capsulae* subglobosae vel trilobatae 5—8 mm longae in pedunculis paulo elongatis basi geniculatis patentissimis.

Holotype: *de Vos 2183* in STE.

Plant aquatic, 30—50 cm tall. *Corm* 6—15 mm diam., obliquely flattened towards the base, with a high crescent-shaped basal ridge; tunics hard, smooth, light brown to dark brown, with fine parallel fibrils on the basal ridge, and apical fibres ca. 5 mm long. *Stem* 6—22 cm long, erect, extending above the water level, upper internode ca. 20 mm long. *Basal sheaths* 1—2, to 70 mm long. *Basal leaves* 2, terete, erect, 30—50 cm long, 1—2 mm diam., 6—8-sulcate, grooves narrow; second basal leaf with a 10—20 cm long stem-clasping leaf sheath; *cauline leaves* 1—2, the first 4—7 cm long, the second shorter and membranous. *Peduncles* semiterete, 30—70 mm long. *Bract* greenish or reddish-green, with narrow membranous margins, almost narrowly triangular, 12—18 mm long, with closely-spaced veins, subacute. *Bracteole* green in centre with wide colourless or fawn membranous margins, subacute to obtuse. *Flowers* 2—4, 25—32 mm long. *Perigone tube* 3—5 mm long, funnel-shaped; *segments* 15—25 mm long, buttercup-yellow (RHS 17B), outer segments ca. 7 mm wide, narrowly obovate, subacute, with a median pattern in brown on the backs, inner segments almost spatulate, ca. 9 mm wide, slightly shorter than the outer, often apiculate. *Stamens* erect, yellow; *filaments* 4—6 mm long, pilose at the base; *anthers* 6—8 mm long. *Ovary* 2—3 mm long, subglobose; *style* 12—15 mm long; *stigmas* 1—2 mm long, at or just above the anther tips. *Capsules* subglobose or with three rounded lobes, 5—8 mm diam., on slightly elongated peduncles which are genuflexed at the bases and widely patent. *Chromosome number* 2n = 24 (*de Vos 2183*).

CALVINIA. Nieuwoudtville: *Loubser 944* (NBG). Between Menzieskraal and Nieuwoudtville: *Markötter STE 18966*. Between Vanrhyns Pass and Nieuwoudtville: *de Vos 2183*.

Flowering period August to October.

In seasonal pools, with the corm and base of the stem embedded in mud.

This rare aquatic species is characterised by two long, erect, cylindrical basal foliage leaves with more than four stomatiferous grooves, by yellow flowers with the inner perianth segments almost spatulate, often apiculate, and slightly wider than the outer, and by subglobose or 3-lobed capsules.

It is closely allied to *R. aquatica* from which it differs in its two basal leaves, its yellow flowers with longer, erect stamens and longer style, and by peduncles which become widely patent in the fruiting stage.

28. **Romulea aquatica** G. J. Lewis, Jl S. Afr. Bot. 4: 8 (1938).

Fig. 32, 41.

Plants 20—60 cm tall. *Corm* subglobose or shortly ovoid, 10—20 mm diam., obliquely flattened towards the base, with a wide crescent-shaped basal ridge; tunics hard, smooth dark-brown, with fine parallel fibrils on the basal ridge, and apical fibres ca. 5 mm long. *Stem* 12—35 cm long, erect, extending above the water level, often deflexed near the top in the fruiting stage. *Basal sheaths* 1—3, up to 12 cm long. *Basal leaf* 1, terete, erect, 25—60 cm long, 0,8—1,5 mm diam., 5—8-sulcate, grooves narrow, sheathing leaf base 3—4 mm wide; *cauline leaves* 1—2 or occasionally 3, erect, up to 11 cm long, with large sheathing leaf-bases, the second and third leaf bract-like with the unifacial part reduced or absent. *Peduncles* almost semiterete, 10—30 mm long, erect or suberect. *Bract* green with narrow membranous margins, ovate to narrowly ovate, concave, 7—16 mm long, acute. *Bracteole* greenish, with wide colourless or brown-speckled membranous margins, subobtuse to subacute or emarginate. *Flowers* 1—5, 20—28 mm long, strongly scented. *Perigone tube* 4 mm long, cup-shaped, pilose near the insertion of filaments; *segments* 16—20 mm long, white or cream in the upper half, buttercup-yellow (RHS 15A) with 3 slender dark lines in the lower half; outer segments 6—9 mm wide, obovate, obtuse, subobtuse or sometimes emarginate, inner segments spatulate, 9—13 mm wide, obtuse or sometimes apiculate. *Stamens* short, pale yellow; *filaments* 2—3 mm long, glabrous except at the base; *anthers* 3—5 mm long, somewhat patent. *Style* 4—8 mm long; *stigmas* ca. 2 mm long, not reaching the anther tips. *Capsules* subglobose with 3 rounded lobes, 8—10 mm diam., on erect peduncles. *Chromosome number* 2n = 24 (*de Vos 1738*).

Lectotype: *Barker 190* in NBG.

PIKETBERG. Elandsvlei, N of Piketberg: *Barker 190*. The Pools: *Lewis 149* (SAM), *Barker 7391* (NBG), *de Vos 1622, 1780*.

HOPEFIELD. 3 miles S of Koperfontein: *de Vos 1738, 2015*.

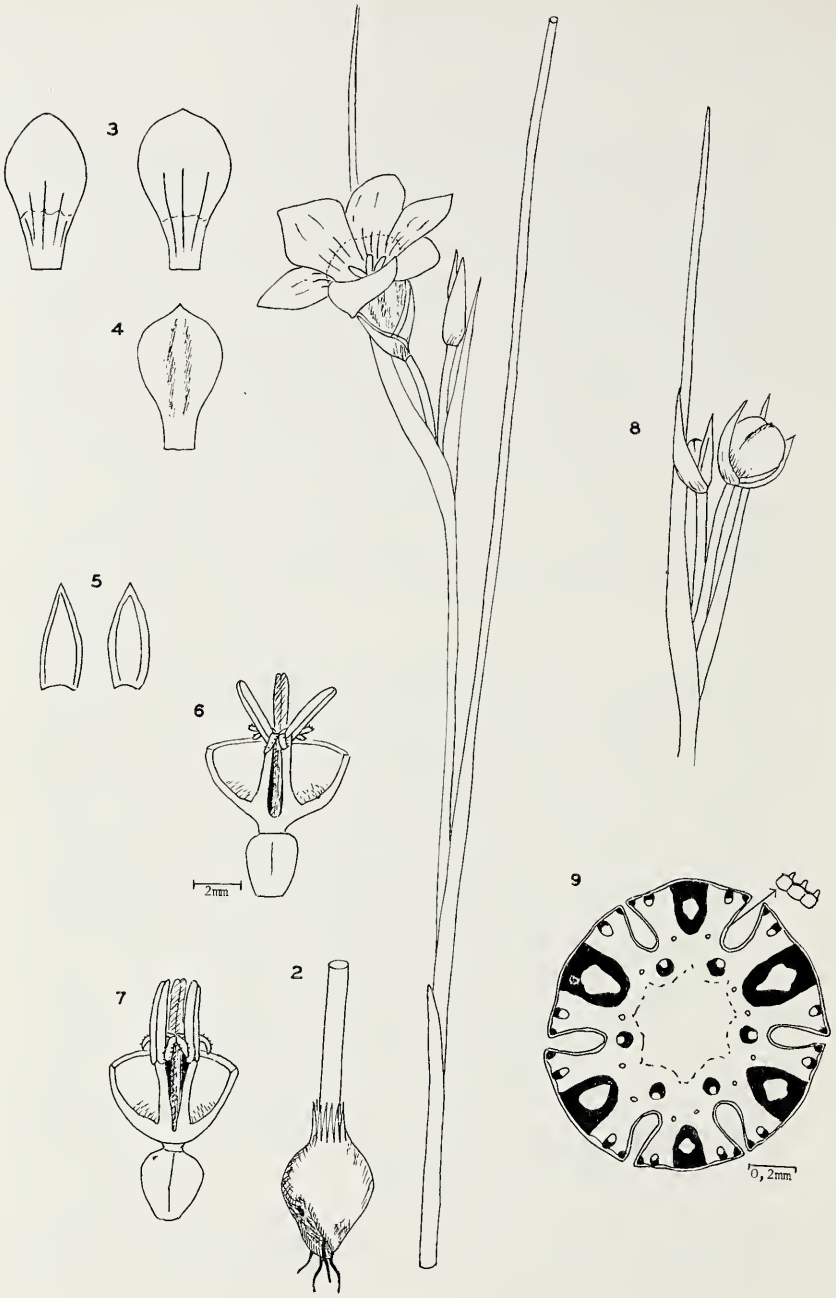


FIG. 41.

R. aquatica (*de Vos* no. *1738*). 1, 2, plant ×1. 3, outer and inner perianth segments, upper surface. 4, inner segment, lower surface. 5, bract and bracteole. 6, 7, pistil, stamens, and perianth tube of two plants. 8, almost mature capsules. 9, transverse section of leaf.

MALMESBURY. Between Hopefield and Moorreesburg: *Mathews BOL 22169*, *SAM 53177*, *Salter 3880* (BOL, K).

Flowering period August to September.

This aquatic species has been found only in clayey seasonal pools, with the corm and lower part of the stem submerged and the corm embedded in the clayey mud of the pool. During summer the pools dry up. Although it has never yet been found on dry ground in the wild, plants were grown in tins in the botanical garden at Stellenbosch for several seasons and flowered under ordinary spring conditions. The pools in which they have been found are about 30 miles apart. Probably more clayey pools suitable for their growth occur between these points.

This species is distinguished by its single, erect, basal leaf with more than 4 stomatiferous grooves, short, largely bifacial, cauline leaves, strongly scented flowers with spatulate inner perianth segments, and large, globose, three-lobed capsules with rather large seeds. The ripe capsules become so heavy that the stem bends near its top, frequently submerging the capsules. The seeds are probably dispersed by birds.

The elongated stem consists for most of its length of only one internode, the next internode being so short that the two cauline leaves are close together. The crescent-shaped basal ridge of the corm is frequently more or less vertical, running across the base of the corm.

R. aquatica is allied to *R. multisulcata*, from which it differs in its single basal leaf, its cream flowers with yellow cups and shorter stamens and style, and its peduncles which remain straight in the fruiting stage.

1.4 Subsection Minutiflorae De Vos subsect. nov.

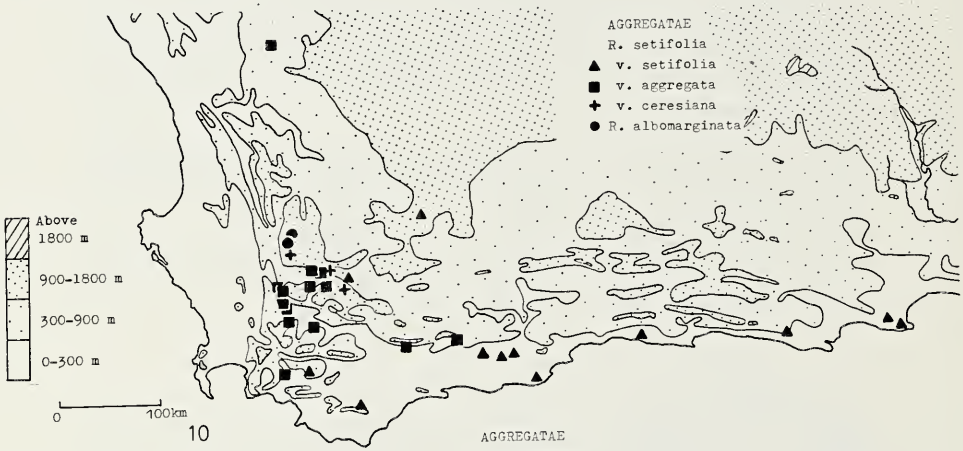
Cormus subelongatus, basi oblique complanatus, crista basilari alta fere complanata praeditus. *Caulis* brevis, basibus foliorum obtectus. *Bracteola* marginibus membranaceis latis brunneo-maculatis. *Flores* pusilli, pallide lilacini vel interdum albi. *Filamenta* glabrata.

Type species: *R. minutiflora* Klatt.

Corm somewhat elongated, obliquely flattened at the base, with a high, prominent, somewhat flattened basal ridge; tunics mostly split into a fringe of parallel fibrils on the basal ridge; *stem* short, hidden by sheathing leaf bases. *Leaves* several, basal, filiform or compressed cylindrical. *Peduncles* becoming arcuate after flowering and elongating slightly. *Bract* greenish or reddish with narrow membranous margins. *Bracteole* with wide, generally brown-spotted, membranous margins. *Flowers* usually less than 20 mm long, pale lilac-pink or sometimes white. *Filaments* glabrescent.


MINUTIFLORAE
R. minutiflora
R. sinispinosensis
PRATENSES
R. pratensis

9


AGGREGATAE
R. setifolia
v. setifolia
v. aggregata
v. ceresiana
R. albomarginata
Above 1800 m
900-1800 m
300-900 m
0-300 m
0
100km

10


AGGREGATAE
R. longipes
R. fibrosa
R. jugicola
R. dichotoma
AMOENAE
R. amoena
R. sanguinalis

11

Leaf anatomy. Upper unifacial part short, forming only the uppermost quarter of the leaf, 4-grooved and 4-ribbed. Each rib with a large and two small vascular bundles. Rib margins somewhat rounded, glabrous, with small subepidermal fibre bundles. Epidermal cells in the grooves papillose. *Styloids* often subepidermal in the costal zones.

The two species of this subsection differ from all others in the high, almost spatulate, basal ridge of the corm and the very small flowers. They show some affinity with the Roseae in which Béguinot had placed *R. minutiflora*. But as

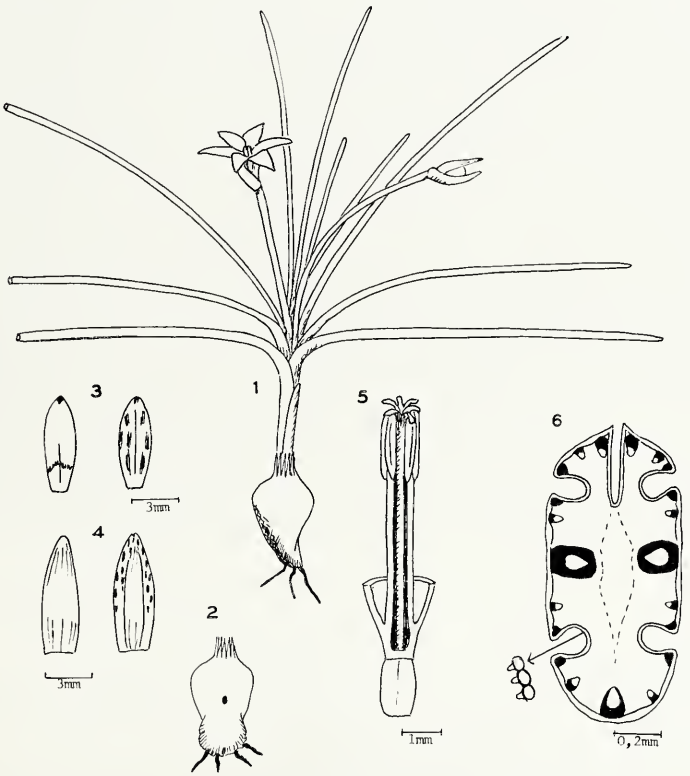


Fig. 42.

R. minutiflora (*de Vos* no. *1766*). 1, plant × 1. 2, corm seen from opposite side. 3, outer perianth segments, upper and lower surfaces. 4, bract and bracteole. 5, pistil, stamens, and perianth tube. 6, transverse section of leaf.

Maps 9–11.

Geographical distribution: 9, species of the *Minutiflorae* and *Pratenses;* 10, subsection *Aggregatae;* 11, subsections *Aggregatae* and *Amoenae*.

there are some important differences in e.g. chromosome number, in the bract and bracteole, and in corm structure, the two species are best placed in a distinct section.

29. **Romulea minutiflora** Klatt, Abh. nat. Ges. Halle 15: 339 (1882), et 1895 p. 165; Baker 1892 p. 102 et 1896 p. 40; Béguinot 1907b p. 105 et 472 pro parte et 1909 p. 79; Lewis 1950 p. 222; de Vos 1965 p. 150.

Fig. 42, 60.

Plants 6—20 cm tall. *Corm* obovoid to somewhat elongated, 10—15 mm long, 5—10 mm diam., obliquely flattened at the base with a high crescent-shaped or somewhat flattened or wavy basal ridge, the tunics hard, smooth, light brown to brown, often with fine parallel fibrils on the basal ridge, and apical fibres 5—8 mm long. *Stem* very short, hidden by the leaf bases. *Basal sheaths* 1—2, 10—30 mm long. *Leaves* several, basal, often 2-ranked, filiform, terete to compressed cylindrical, the lower ones arcuate, 6—20 cm long, 0,5—1,3 mm diam., grooves narrow, sheathing leaf bases up to 5 mm wide. *Peduncles* 20—50 mm long, semiterete. *Bract* submembranous or greenish in upper half, with narrow, often brown-speckled membranous margins, almost ovate, 6—10 mm long, acute to sub-obtuse. *Bracteole* membranous or somewhat herbaceous in the centre near the tip, with wide, generally brown-spotted membranous margins. *Flowers* 1—4 or more, 7—15 mm long. *Perigone tube* 1,5—3,5 mm long; *segments* elliptical to narrowly elliptical, 4—9 mm long, 1,5—2,5 mm wide, obtuse, pale mauve or lilac (RHS 75C, D, 76A, 77B), rarely almost white, usually with a violet circle in the throat, the cup greenish-yellow, the outer segments greenish or mottled on the backs. *Stamens* erect, somewhat exserted and reaching more than halfway up the perigone; *filaments* 2—4 mm long, glabrescent; *anthers* 1,5—2 mm long, pale yellow. *Ovary* 1—3 mm long; *style* 4—6 mm long; *stigmas* ca. 1 mm long, reaching the anther tips. *Capsules* ellipsoidal, up to 15 mm long, on arcuate peduncles which straighten when drying out. *Chromosome number* 2n = 26 (*de Vos 1766*).

Type: The holotype, *Drège 538* in Hb. Lübeck in B, was probably destroyed in 1942, as it was unobtainable. The isotype *Drège 538*, in S, is chosen as lectotype. *Drège 538* in P, however, is not this species.

CALVINIA. Beyond Grasberg: *de Vos 2025*. Between Nieuwoudtville and Oorlogskloof: *de Vos 1990*.

CLANWILLIAM. Pakhuis Pass: *de Vos 1647*. Foot of Grey's Pass near Citrusdal: *Lewis 2014* (SAM). Grey's Pass N side: *Barker 6408* (NBG). Foot of Wolfsberg, Sederberge: *de Vos 2032*.

PIKETBERG. Near The Rest: *Lewis* s.n. (BOL).

CERES. Koue Bokkeveld: *Schlechter 8889* (BOL, PRE, GRA, K, S, Z). Theronsberg: *Barker 1972* (NBG). Theronsberg, near Delarey: *de Vos 2130*. Top of Hotnotskloof: *de Vos 1781*. Between Hotnotskloof and Karoopoort: *de Vos 1675*.

WORCESTER. *Leipoldt* Aug. 1926 (BOL). Versus Hexflussberg: *Drège 538* (S, not P).

MALMESBURY. *L. Bolus STE 17434*. Melkbosstrand: *L. Bolus* Sept. 1926 (BOL).

Between Salt River and Kalabaskraal: *Hutchinson 154* (BOL, PRE, K).
CAPE. Green Point Common: *Salter 7680A* (SAM). Near Rietvlei: *Salter 3546* (BOL, K).
STELLENBOSCH. *Garside 1030* (K). Upper part of golf course: *Duthie 1463a* (STE). Along streets of Stellenbosch: *de Vos 1766*.
CALEDON. Between Caledon and Riviersonderend: *de Vos 1962*.
ROBERTSON. Koppie towards McGregor: *de Vos 2234*.
LAINGSBURG. Tweedside: *Lewis* s.n. (BOL), *de Vos 1798*.
LADISMITH. Seweweekspoort: *Phillips 1524B* (SAM).
PRINCE ALBERT. Swartberge: *de Vos 1904*.
OUDTSHOORN. Hoeko: *de Vos 2224*.
UNIONDALE. Prince Alfred Pass: *de Vos 2225*.
WILLOWMORE: Top of Nuwekloof: *de Vos 2233*.
BREDASDORP. De Hoop: *de Vos 2223*.
SWELLENDAM. Bontebok Park: *Acocks 21353* (PRE).
HEIDELBERG. *Rogers 4386, 4686* (BOL).
RIVERSDALE. *Muir 4873* (K). Streets of Riversdale: *Galpin 5358* (GRA, PRE). Around Albertinia: *Muir 505* (BOL, PRE). Streets and distr. Albertinia: *Marloth 5628* (PRE). The Fisheries: *Acocks 21353* (PRE). N side of Garcias Pass: *Barker 7364* (NBG).
MOSSELBAY. *Rogers* s.n. (Fl. Cap.!) (K). The Point: *Rogers 1/80* (K). Little Brak: *Whaits 73* (NBG).
KNYSNA. Belvidere: *Duthie 1245* (STE). Barrington-Mossel Bay: *Fries, Norlindh & Weimarck 1291* (PRE).
PORT ELIZABETH. Swartkops River: *Pappe SAM 20734* partly.
ALBANY. Grahamstown lawns: *Guillarmod 5007* (RUH, NBG, STE partly), *5240* (RUH, STE).
SOUTH AFRICA, without locality. *Drège* s.n. (K).
AUSTRALIA. Mt. Compass: *Kaspiew 11* partly (S).

Flowering period July to September.

This is one of the most widely distributed species in the Cape Province and has also been introduced into Australia. It has the smallest flowers in the genus and is further characterised by mostly pale mauve flowers with obtuse perianth segments, stamens with very short, somewhat exserted anthers, corm with a high, more or less spatulate basal ridge, and almost wholly membranous bracteoles, generally with relatively large brown spots. Only rarely are these spots on the bracteoles replaced by minute stripes.

This species stands very close to *R. pratensis* and *R. sinispinosensis* which, with their high chromosome numbers, might be polyploids partly derived from *R. minutiflora* (de Vos 1965 and this work under Phylogeny).

30. **Romulea sinispinosensis** De Vos sp. nov.

Fig. 43.

Cormus obovoideus vel parum elongatus, 12—15 mm longus, 8—12 mm diam., basi oblique complanatus, crista alta lunata vel aliquantum complanata ciliata, tunicis rigidis laevibus brunneis, apice fibris 5—7 mm longis praedito. *Caulis* perbrevis vaginis foliorum obtectus. *Vagina basilaris* una. *Folia* plura basilaria filiformia teretia vel compresso-cylindrica, inferiora arcuata 12—20 cm longa ca. 1 mm diam. sulcis angustis, basibus vaginantibus ad 5 mm latis. *Pedunculi* 30—40 mm longi semiteretes. *Bractea* viridis vel rubella, marginibus membranaceis perangustis, anguste ovata, 9—10 mm longa subacuta. *Bracteola*

pro parte majore membranacea, in medio nervis angustis rubiginosis, marginibus latis albis membranaceis, ad apicem dilute brunneo-punctatis. *Flores* 1—3, 16—20 mm longi. *Tubus perigonii* 2,5—3 mm longus infundibuliformis; *segmenta* anguste obovata 10—12 mm longa 3—4 mm lata obtusa vel subobtusa vel emarginata, eburnea vel alba, flavido-viridia in dimidio inferiore et a dorso segmentorum exteriorum. *Stamina* erecta, parum supra dimidium perigonii

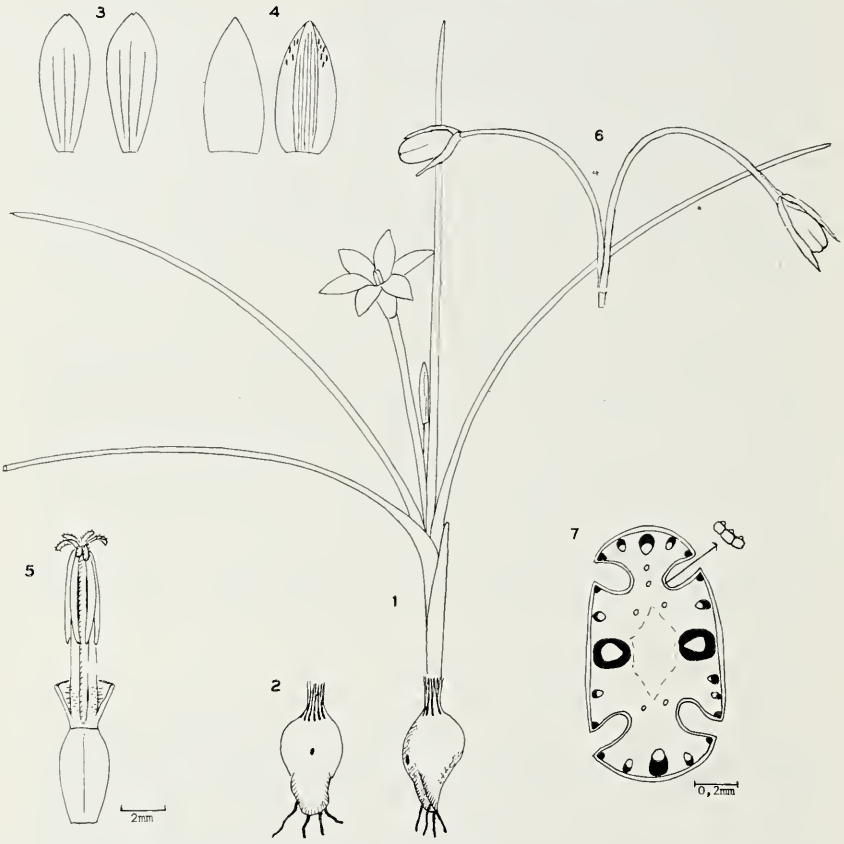


FIG. 43.

R. sinispinosensis (*de Vos* no. *2106*). 1, plant ×1. 2, corm seen from opposite side. 3, outer and inner perianth segments, upper surface ×2. 4, bract and bracteole ×2. 5, pistil, stamens, and perianth tube. 6, ripening capsule ×1. 7, transverse section of leaf.

attingentia, flavida; *filamenta* 3—4 mm longa glabrata; *antherae* 3,5—4 mm longae. *Ovarium* 3—4 mm longum; *stylus* 6—8 mm longus; *stigmata* ca. apices antherarum attingentia. *Capsulae* breviter cylindraceae 10—15 mm longae, in pedunculis primo curvatis tandem erectis.

Holotype: *de Vos 2106* in STE.

Plants 12—20 cm tall. *Corm* obovoid to somewhat elongated, 12—15 mm long, 8—12 mm diam., obliquely flattened at the base with a high crescent-shaped or somewhat flattened basal ridge; tunics hard, smooth, brown, with fine parallel fibrils on the basal ridge and apical fibres 5—7 mm long. *Stem* very short, hidden by leaf bases. *Basal sheath* single, 25—35 mm long. *Leaves* several, basal, filiform, terete to compressed cylindrical, lower ones arcuate, 12—20 cm long, ca. 1 mm diam., grooves narrow, sheathing leaf bases to 5 mm wide. *Peduncles* 30—40 mm long, semiterete. *Bract* green or reddish with very narrow membranous margins, narrowly ovate, 9—10 mm long, subacute. *Bracteole* largely membranous with slender reddish-brown veins in the centre and wide, white membranous margins, with faint brown spots towards the tip. *Flowers* 1—3, 16—20 mm long. *Perigone tube* 2,5—3 mm long, funnel-shaped; *segments* narrowly obovate, 10—12 mm long, 3—4 mm wide, obtuse, subobtuse or emarginate, cream or white, yellowish-green in lower half and on the backs of outer segments. *Stamens* erect, reaching slightly more than halfway up the perigone, pale yellow; *filaments* 3—4 mm long, almost glabrous; *anthers* 3,5—4 mm long. *Ovary* 3—4 mm long; *style* 6—8 mm, with stigmas more or less at the anther tips. *Capsules* shortly cylindrical, 10—15 mm long, on peduncles at first curved, later erect. *Chromosome number* 2n = 50 (*de Vos 2106*).

VREDENDAL. Doringbaai near sea coast: *de Vos 2106*.

Flowering period August.

This species, with rather inconspicuous flowers, was collected only once in 1968 on the coastal plateau near the sea shore at Doring Bay. It is closely allied to *R. minutiflora* and was at first thought to be a slightly larger form of the latter species. But it is a polyploid and crossing experiments produced only small numbers of seemingly normal seeds which failed to germinate.

Its chromosome number indicates that it could have originated as an amphidiploid between *R. minutiflora* and some other species with 24 chromosomes. It forms no abortive pollen grains and all grains are of equal size. This also points to an amphidiploid origin.

It is readily distinguished from *R. minutiflora* by its slightly larger, white or cream flowers with longer anthers, style and ovary, and slightly wider perianth segments, and by its bracteoles with only faint indications of the characteristic spots of *R. minutiflora*.

The name is derived from its type locality, translated into Latin.





MAPS 12, 13.
Geographical distribution: 12, species of subsection *Tortuosae;* 13, subsection *Longitubae.*

2 Section Tortuosae Béguinot

Corm flattened or slightly concave on one side, with a wide, almost vertical, fan-shaped ridge across the base; tunics split on the ridge into fine parallel fibrils which are often clustered into irregular groups. *Stem* short, hidden by the leaf bases. *Leaves* several or rarely only one, basal, filiform, spirally twisted or flexuose or sometimes bent or suberect, 0,5—1 mm diam., for the larger part bifacial, and conduplicate, unifacial near the tips, glabrous or minutely ciliate. *Peduncles* subterranean or shortly extending above-ground, coiled or strongly recurved in fruiting specimens. *Bract* and *bracteole* generally membranous or submembranous in the lower half, green or greenish towards the tips, acute to acuminate. *Flowers* large to medium-sized or rarely small, yellow, sometimes with dark blotches on the limbs, often orange-yellow in the cup. *Perigone tube* short and funnel-shaped, or long and tubular, widened towards the top. *Stamens* erect, inserted in the lower half of the perigone tube or near the top where it widens.

Type species: *R. tortuosa* Bkr.

Leaf anatomy. The long lower bifacial part of the leaf, as well as the short unifacial top part, 4-grooved and 4-ribbed. Each rib with a single large vascular bundle with a small sclerenchymatic sheath separated from the epidermis by a parenchymatic sheath, and usually with two deep-seated small vascular bundles. Rib margins glabrous or minutely ciliate, without subepidermal fibres. Epidermal cells large, in the grooves without papillae or with low papillae. Styloids present in the parenchymatic bundle sheaths and scattered in the mesophyll; short crystals absent.

The species of this section occur on inland plateaux and mountain ranges 800 to 2 700 metres in altitude.

The two subsections are closely allied and have the same chromosome number and fairly similar vegetative features, including leaf anatomy. They differ mainly in the length of their perianth tubes, subsection *Tortuosae* being the less specialised. *R. austinii* links this subsection with the *Ciliatae*.

2.1 Subsection Tortuosae

Stirps *Tortuosae* Béguinot 1909 p. 96. Stirps *Tridentiferae* Béguinot nom. nud. 1908a p. 160.

Leaves several or rarely only one, spirally twisted or flexuose or sometimes suberect or bent, bifacial almost to the tips, sometimes minutely ciliate. *Peduncles* usually extending above-ground, coiled or strongly recurved in fruiting specimens. *Bract* and *bracteole* up to 25 mm long. *Flowers* 15—55 mm long, often with dark blotches or veins halfway up the perigone. *Perigone tube* short

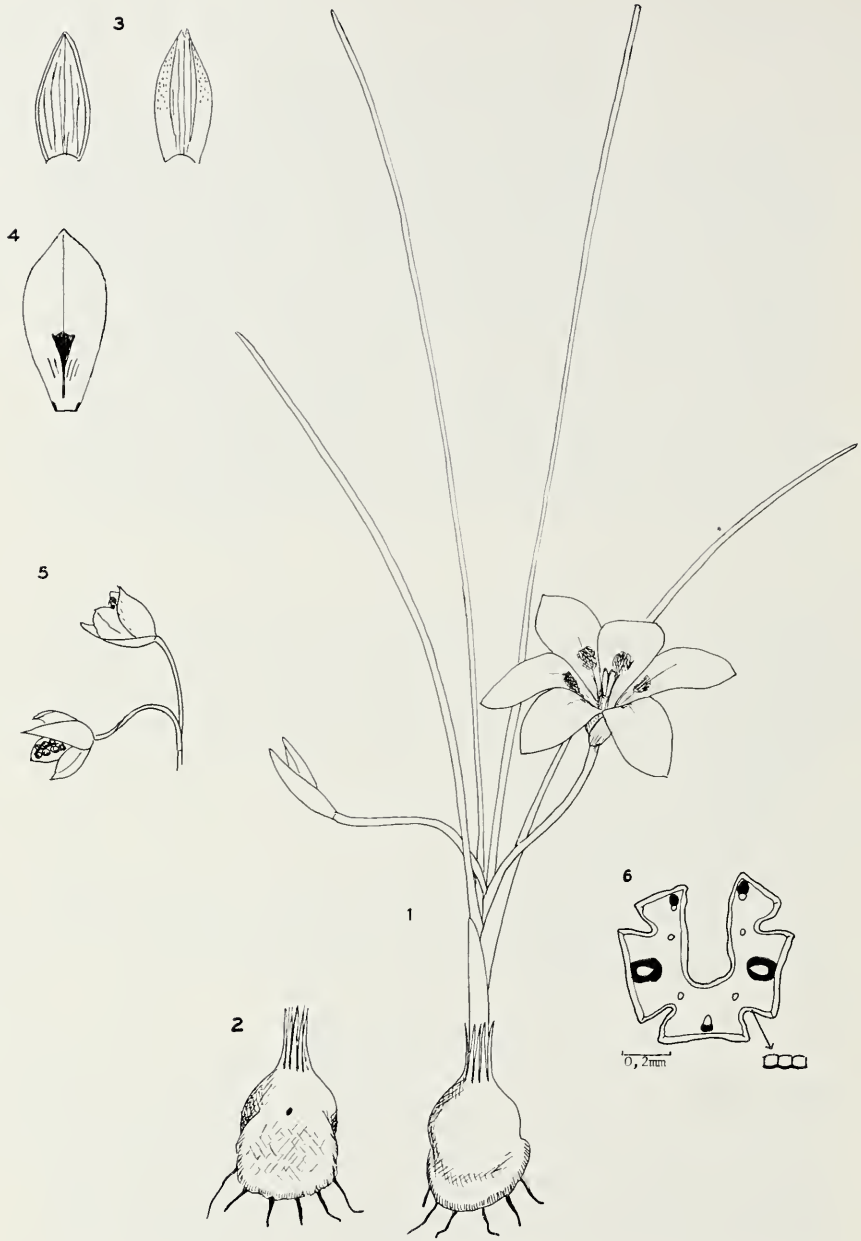


FIG. 44.
R. austinii (*de Vos* no. *1950*). 1, plant ×1. 2, corm from opposite side. 3, bract and bracteole ×1. 4, outer perianth segment, upper surface. 5, mature capsules ×1. 6, transverse section of leaf.

or up to 10 mm long, funnel-shaped. *Stamens* inserted in the lower half of the perigone tube or where it widens.

Leaf anatomy. The leaf is largely bifacial and conduplicate, with only the upper 15—60 mm unifacial. Further as in the section.

31. **Romulea austinii** Phill. Flow. Pl. S. Afr. 3: 90 (1932); de Vos 1965 p. 138. Icon: Flow. Pl. S. Afr. l.c.; this work Fig. 44.

Plants 6—20 cm tall. *Corm* 5—12 mm diam., obliquely flattened on one side, with a wide crescent-shaped basal ridge; tunics hard, smooth, brown, with fine parallel fibrils on the basal ridge, and apical fibres 5—15 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* 1—2, 10—35 mm long. *Leaves* 3—6, basal, filiform, 4—20 cm long, 0,5—1 mm diam., erect, bent, or sometimes slightly flexuose, grooves narrow, the adaxial groove open up to 50 mm from the tip, sometimes sparsely ciliolate on the rib margins, sheathing leaf bases 2—4 mm wide. *Peduncles* 15—50 mm long, semiterete, erect or bent. *Bract* green in the upper half, submembranous or greenish in the lower, with very narrow membranous margins, and slender, widely spaced veins, 10—15 mm long or up to 22 mm, acute, subacute or toothed. *Bracteole* green in the centre of the upper half, with wide, brown-edged or brown-stippled membranous margins. *Flowers* 1—3, 20—33 mm long. *Perigone tube* 4—5 mm long, funnel-shaped; *segments* narrowly elliptical to narrowly obovate, 14—25 mm long, 5—9 mm wide, acute or subacute, jasmine-yellow (RHS 10A, B, 12B), usually with spade-shaped, brownish-black blotches in the throat, outer segments dark-veined or greenish-brown on the backs. *Stamens* erect, inserted in the lower half of the perigone tube, yellow; *filaments* 5—7 mm long, pilose and widened at the bases; *anthers* 3—6 mm long, at first joined at the tips. *Style* 9—14 mm long; *stigmas* at the anther tips or slightly higher or lower. *Capsules* ellipsoidal, up to 10 mm long, on curved, slightly flexuose peduncles. *Chromosome number* 2n = 30 (*de Vos 1950*).

Holotype: *Austin 2572* in PRE. Isotypes in K and BOL.

CALVINIA. Hantam Mts.: *Meyer* ann. 1869 (S).
CERES. 3 mls. E of Karoopoort: *Hall 2379* (NBG). Rooifontein, Ceres-Karoo: *de Vos 2179*.
MONTAGU. Near Montagu: *Salter 1053* (BOL).
LAINGSBURG. Matjiesfontein: *Austin 2572*, *Pearson NBG 2544/14 2504/14* (BOL), *de Vos 1795*, *1950*. Whitehill: *Compton 2832*, *5305* (BOL), *10857* (NBG). Ngaap Kop: *Compton 14585* (NBG).
PRINCE ALBERT. *Tugwell NBG 2686/14* (BOL). Swartberg: *Pocock S112* (BOL, PRE).
GEORGE. North of Outeniqua Pass: *de Vos 2162*. Montagu Pass: *Castelnau* (P).
UNIONDALE. Near Olifants River: *Taylor 446* (BOL).
PORT ELIZABETH. Near Port Elizabeth: *Drège 8451* partly (S).
WITHOUT LOCALITY. *Drège 8451* (P).

Flowering period May to July, depending on the rains.

This species stands between *R. tortuosa* and *R. montana* and connects the

Tortuosae and the Ciliatae. It differs from *R. tortuosa* in its corm which has a less expanded ridge, in its straighter leaves, greener bract and bracteole, and in its anthers which are shorter than the filaments. Anatomically the leaves of the two species are similar, e.g. in being bifacial almost to their tips. The distribution of the two species is contiguous, overlapping in the Matjiesfontein and Montagu districts, with *R. austinii* occurring farther to the south and east, and *R. tortuosa* north-westwards.

R. austinii differs from *R. montana* in its shorter stem, more membranous, and proportionally wider bract and bracteole, and in its filaments with widened, pilose bases.

Phillips (1932) considered *R. hirsuta* Eckl. var. *aurantiaca* Schltr. to be the same as this species, but *Sclechter 8847*, on which the varietal epithet was based (Schlechter, 1900 p. 90), stands closer to *R. montana* and has now been transferred to that species.

The yellow colour of the perianth fades in dried specimens exposed to light, the perianth becoming whitish inside and purple-veined or pinkish on the back. Meyer's collection (ann. 1869), placed under *R. sublutea* Baker in S, probably belongs to this species. The colour of the perianth has faded and no dark marks or veins are visible. But the corm, short stem, and characters of bract and bracteole suggest an alliance with *R. austinii*.

In specimens cultivated in a more humid climate, the membranous margins of the bracts and bracteoles lose their light brown colouring and become white.

The wide basal ridge of the corm is especially evident in young plants which flower for the first time. When older, the corms expand and the ridge is consequently narrower in proportion to the corm diameter.

32. **Romulea tortuosa** (Licht. ex Roem. & Schult.) Bkr. J. Linn. Soc. 16: 88 (1877).

Plants 5—25 cm tall. *Corm* 7—20 mm diam., flattened or somewhat concave on one side, convex on the other, with a wide fan-shaped, almost vertical basal ridge; tunics hard, smooth, brown, with rows of fine parallel fibrils irregularly grouped on the ridge, and apical fibres 7—20 mm long. *Stem* short, hidden by the sheathing leaf bases. *Basal sheaths* 1—2, 10—40 mm long. *Leaves* several, basal, filiform, spirally twisted, flexuose or sometimes suberect, 8—25 cm long, 0,5—1 mm diam., grooves narrow, with the adaxial groove open almost to the tip, minutely and sparsely ciliate on the rib margins or glabrous, leaf bases 4—6 mm wide. *Peduncles* 10—80 mm long, semiterete, suberect. *Bract* and *bracteole* largely membranous or submembranous, greenish towards the tips or with green or reddish veins, 10—25 mm long, acute to acuminate. *Flowers* 1—4, 15—55 mm long. *Perigone tube* 3—10 mm long, funnel-shaped; *segments* obovate to narrowly obovate-spathulate, rarely narrowly elliptical, 10—40 mm

long, 2—12 mm wide, acuminate to obtuse, often apiculate, pale yellow, buttercup-yellow to almost cadmium-orange, upper part of segments sometimes lighter yellow, often with a spade-shaped or tridentate black blotch in the middle of each segment or with black veins, outer segments sometimes greenish-brown on backs. *Stamens* erect, inserted in perigone tube where it widens, generally reaching about halfway or higher up the perigone, yellow; *filaments* 3—10 mm, pilose and often slightly wider at the bases; *anthers* 3—10 mm. *Style* 7—20 mm; *stigmas* slender, to 6 mm long, reaching the anther tips or higher. *Capsules* subglobose to ellipsoidal, up to 10 mm long, on peduncles which later become reflexed or spirally twisted. *Chromosome number* 2n = 30 (*de Vos 1948*, *1700*, *1988*, *2125*).

Holotype: A collection in B, labelled *Ixia tortuosa* and *R. tortuosa* Bkr., hab. ad C.B.S. This is undoubtedly Lichtenstein's collection from Jakhalsfontein in the Middle Roggeveld. Béguinot was also convinced of this.

In inland districts of the south western Cape on plateaux over 900 m in altitude.

The species is readily distinguished by its fan-shaped corm and yellow flowers.

KEY TO THE SUBSPECIES

1 Flowers generally more than 25 mm long, rarely slightly smaller, bright golden-yellow; perigone segments more than 5 mm wide; stamens more than 9 mm long, reaching about halfway up the perigone; style more than 10 mm long.
 2 Perigone generally with dark blotches or veins in the throat; segments widest just above middle, acute to subacute rarely subobtuse, sometimes darker yellow towards base. a. Subsp. *tortuosa*
 2 Perigone without dark blotches or lines; segments widest in upper quarter, obtuse and frequently apiculate, slightly paler yellow in upper third or quarter. . b. Subsp. *aurea*
1 Flowers 15—20 mm long, rarely to 25 mm, usually pale yellow; perigone segments less than 5 mm wide; stamens up to 9 mm long; often reaching more than halfway up the perigone; style up to 10 mm long c. Subsp. *depauperata*

a. Subsp. **tortuosa**

R. tortuosa (Licht. ex Roem. & Schult.) Baker 1877 p. 88 et 1892 p. 100 et 1896 p. 37; Klatt 1882 p. 399 et 1895 p. 167; Béguinot 1907b p. 112 et p. 475 et 1909 p. 96; de Vos 1952a p. 77. *R. tridentifera* Klatt 1882 p. 398 et 1895 p. 167—type: *Meyer* ann. 1869 (S, only one flower); Baker 1892 p. 101 et 1896 p. 39; Béguinot 1907b p. 112 et 1909 p. 97.

Ixia tortuosa Licht. ex Roemer & Schultes 1817 p. 375—type: sub *Ixia tortuosa* s.n. (B); Lichtenstein 1812 p. 289 nom. nud.

Trichonema tortuosum Ker 1827 p. 83; Klatt 1865–66 p. 666.

Bulbocodium tortuosum (Bkr.) Kuntze 1891 p. 701.

Icones: de Vos 1952a p. 79; this work Fig. 45.

Bract and *bracteole* 12—20 mm long, the bracteole with 2—3 slender veins.

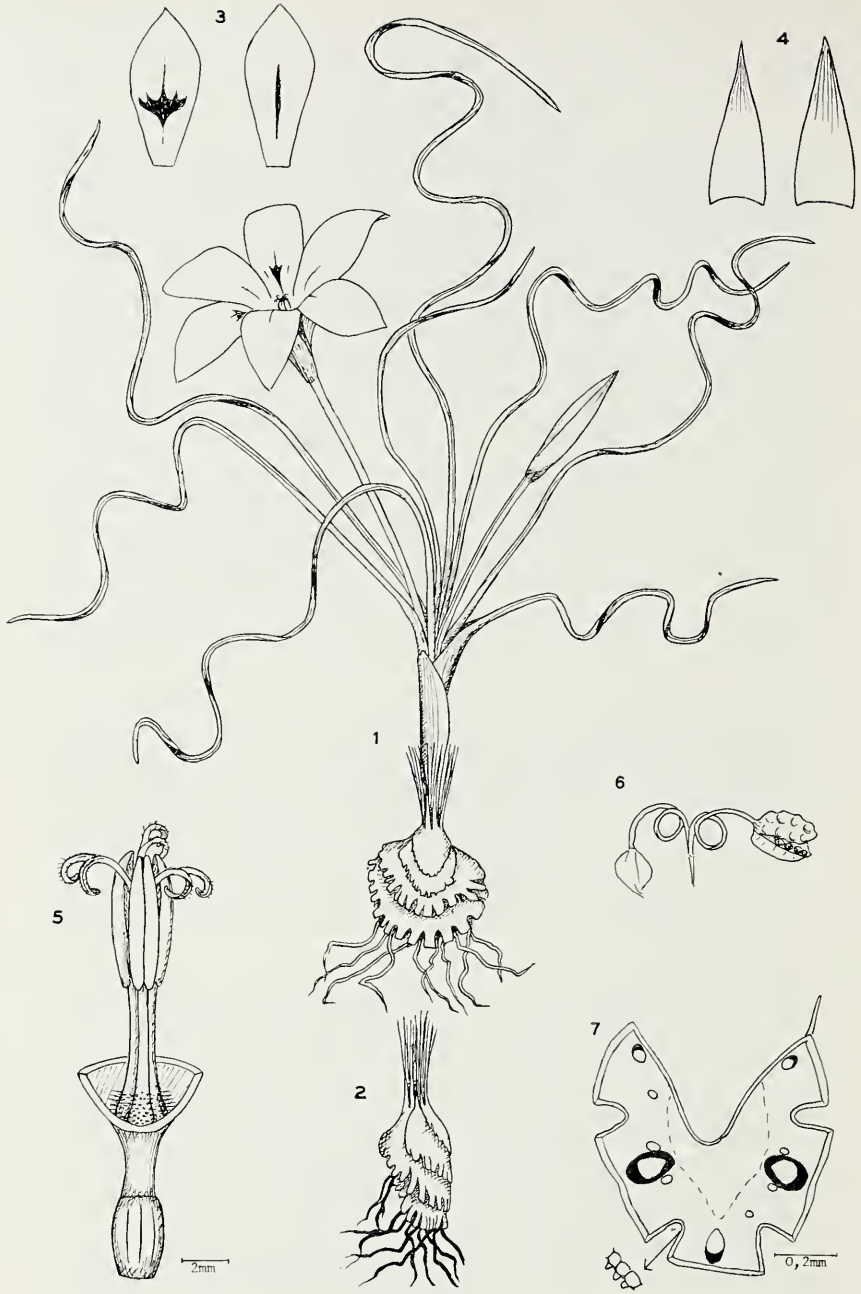


FIG. 45.

R. tortuosa spp. *tortuosa* (*de Vos* no. *1948*). 1, plant at least four years old ×1. 2, corm seen from the side. 3, outer and inner perianth segments, upper surfaces. 4, bract and bracteole ×1. 5, pistil, stamens, and perigone tube. 6, mature capsules ×1. 7, transverse section of leaf.

Flowers 25—37 mm long, rarely smaller. *Perigone tube* 5—7 mm long; *segments* (narrowly) obovate, sometimes narrowly elliptical, 6—10 mm wide, acute or subacute, rarely subobtuse, golden-yellow (RHS 12A, 15C), orange-yellow in the cup or lower half, generally with a large or small black blotch in the middle of each segment or 1—3 black veins. *Filaments* 5—8 mm long, widened at the bases; *anthers* 4—7 mm, sometimes only 3 mm long. *Style* 10—16 mm long; *stigmas* usually at or near anther tips.

NAMAQUALAND. 22 mls. NE of Middelpost on the Leliefontein road: *Salter 6681* (BOL).

CALVINIA. Hantam Mts.: *Meyer* ann. 1869 (S). 9 mls. NW of Middelpost: *Salter 3487* partly (BOL). Nieuwoudtville: *Acocks 18211* (PRE). Top Gannaga Pass: *de Vos 2198*. Bloemfontein E of Middelpos: *Barker 10771* (NBG).

CLANWILLIAM. Elandskloof: *Lewis* s.n. (BOL).

CERES. Leeurivier: *Lewis 1631* (SAM), *Compton 1734A* (NBG). Bokkeveld near Elandskloof: *Leighton 1284* (BOL), *Lewis* Sept. 1936 (BOL). Between Elandskloof and De Keur: *Martin NBG 2056/36*. North of Gydo Pass: *de Vos 1274, 1572*. 3 mls. E of Karoopoort: *Hall 2379* (NBG). Ondertuin: *Hanekom 1433* (PRE).

SUTHERLAND. Between Jakhals Fountain and Kuilenberg in the Middle Roggeveld: *Burchell 1343* (K). Geelhoek, 10 mls. WSW of Sutherland: *Acocks 16988* (PRE). South of Sutherland: *de Vos 1948*. Top of Komsberg Pass: *de Vos 1594*. Voëlfontein: *Hall 3249* (NBG). Damslaagte: *de Vos 1598*. Near Laingsburg border, towards Matjiesfontein: *de Vos 2218*.

LAINGSBURG. Klein Roggeveld: *Compton 7276* (NBG).

WITHOUT LOCALITY. C.B.S. sub *Ixia tortuosa* and *R. tortuosa* Bkr. (B).

Flowering period July to September.

Klatt (1882) placed specimens with dark tridentate marks on the perianth in a separate species, *R. tridentifera*. His type material, *Meyer* (ann. 1869) in B, was destroyed in the war, according to information obtained from that herbarium. In S, however, there is a single flower of this collection. Béguinot, who probably saw the type in B, stated (1909 p. 98) that *R. tridentifera* differs from *R. tortuosa* only in the leaves which are pilose on the outer margins of the grooves, and in the distinct ocellate spots in the throat of the perianth, these two characters being absent in *R. tortuosa*. With the recent collection of more material, it has become evident that these character pairs do not always occur together, and that they are clines with many intermediates. *R. tridentifera* cannot, therefore, be upheld as a distinct species or even variety.

b. Subsp. **aurea** (Klatt) De Vos stat. nov.

R. aurea Klatt 1882 p. 399 et 1895 p. 162; Baker 1892 p. 100 pro syn. et 1896 p. 37 pro syn.: non *R. aurea* Schltr. ined.

Icones: Sub *R. aurea* Klatt in S ined.; this work Fig. 34, 46.

Bract and *bracteole* 15—25 mm long, the latter sometimes two-keeled in the upper half. *Flowers* 30—55 mm long, fragrant. *Perigone tube* 5—10 mm long; *segments* narrowly obovate-spatulate, 7—12 mm wide, obtuse and frequently apiculate, buttercup-yellow to almost cadmium-orange (RHS 15A, 23A), without dark marks, the upper third or quarter of the segments paler



FIG. 46.

R. tortuosa spp. *aurea* (*de Vos* no. *1700*). 1, plant, at least three years old ×1. 2, side view of corm. 3, 4, outer and inner perianth segments of two plants upper surfaces. 5, bract and bracteole ×1. 6, pistil, stamens, and perianth tube. 7, mature capsules ×1. 8, transverse section of leaf.

buttercup-yellow (RHS 15C). *Filaments* 3—10 mm long, slightly wider at their bases; *anthers* 5—10 mm. *Style* 14—20 mm; *stigmas* up to 6 mm long, mostly overtopping the anthers.

Holotype: *Meyer*, ann. 1869 in B.

CALVINIA. Hantam Mts.: *Meyer* (1869). Northern hills Calvinia: *Marloth 10251* (PRE, STE). 7 mls. N of Calvinia: *Hall 985* (NBG). Papelfontein Onder-Bokkeveld: *Schlechter 10894* (BOL, GRA, PRE, G, K, S, P, Z). Niewoudtville: *Ross-Frames BOL 19221*, *Schmidt 619* (PRE, K), *Burger STE 30223*, *30224*. Road to Botterkloof: *de Vos 1700*. 10 mls. E of Nieuwoudtville: *Lewis & Davis SAM 60106*. Doornbos road 5 mls. S of Ariesfontein: *Salter 3501* (BOL, K). Near Grasberg: *Lewis 5826* (NBG), *de Vos 2094*. Oorlogskloof road: *Nordenstam 762* (NBG). 9 mls. NW of Middelpost: *Salter 3487* partly (BOL).
LAINGSBURG. *Theron 1256* (K, PRE) is probably this subspecies.

Flowering period June to August.

The subspecies *aurea* is here regarded as a distinct geographical race. It is generally readily distinguishable from the typical subspecies by its slighly larger, crocus-like, fragrant, buttercup-yellow or almost orange-yellow flowers without dark markings, with the upper part of the perianth segments paler yellow; the segments are narrowly obovate-spatulate and widest near the obtuse, frequently apiculate tips, and the stigmas usually overtop the anthers. These distinctive features would seem to be sufficient to retain *aurea* as a distinct species, and most collections can readily be allocated to either of the two subspecies. Several collections, however, seem to connect the two groups: *de Vos 2100* and *2157* (Worcester-Koo) and *de Vos 2218* (Sutherland-Matjiesfontein) have some specimens with hardly any black marks and some with obtuse perianth segments. *Acocks 18211* (Nieuwoudtville) shows indications of dark marks on some of the segments. These have been placed with the typical subspecies. *Salter 3487* (from near Middelpost, Calvinia) seems to be partly *tortuosa* and partly *aurea*, and *Theron 1256* (Laingsburg) seems to stand nearer *aurea*.

Baker (1892, 1896) and Béguinot (1909 p. 99) cited *R. aurea* Klatt as a synonym of *R. sublutea* (i.e. *R. triflora*). The latter is, however, quite different except for its yellow perianth.

Specimens belonging to subspecies *aurea* have been misidentified as *R. tridentifera* (a synonym of *R. tortuosa* subsp. *tortuosa*) in several herbaria. This view cannot be accepted, as the latter is characterised by a perianth with dark blotches on it.

c. Subsp. **depauperata** De Vos subsp. nov.
Fig. 47.

Bractea et *bracteola* pro parte majore membranaceae, 10—15 mm longae. *Flores* 15—20 mm vel interdum ad 25 mm longi. *Tubus perigonii* plerumque 3—6 mm longus; *segmenta* anguste elliptica vel anguste obovata 2—4 mm lata,

acuta vel acuminata, subflava, in medio quoque segmenti macula parva fuliginea vel 1—3 nervis fuligineis. *Filamenta* 3—5 mm longa; *antherae* 3—4 mm longae, supra dimidium perigonii attingentes. *Stylus* 7—10 mm longus, stigmatibus apices antherarum attingentibus.

Holotype: *de Vos 1273* in STE.

Bract and *bracteole* largely membranous, 10—15 mm long. *Flowers* 15—20 mm or sometimes to 25 mm long. *Perigone tube* 3—6 mm or sometimes up to 8 mm long; *segments* narrowly elliptical to narrowly obovate, 2—4 mm wide, acute to acuminate, pale buttercup-yellow (RHS 10C, 11B), with a small dark blotch or with 1—3 dark veins halfway up each segment. *Filaments* 3—5 mm; *anthers* 3—4 mm, reaching more than halfway up the perigone. *Style* 7—10 mm, with stigmas at the anther tips.

CERES. *Leipoldt* Aug. 1927 (BOL). Summit of Gydouw Pass: *Salter 2626* (BOL, K), *de Vos 1273*. Hotnotskloof: *de Vos 1782*. Cold Bokkeveld at foot of Rocklands Peak: *Esterhuyzen 17380* (STE), *17381* (BOL). Towards Touwsrivier: *de Vos 2125*.

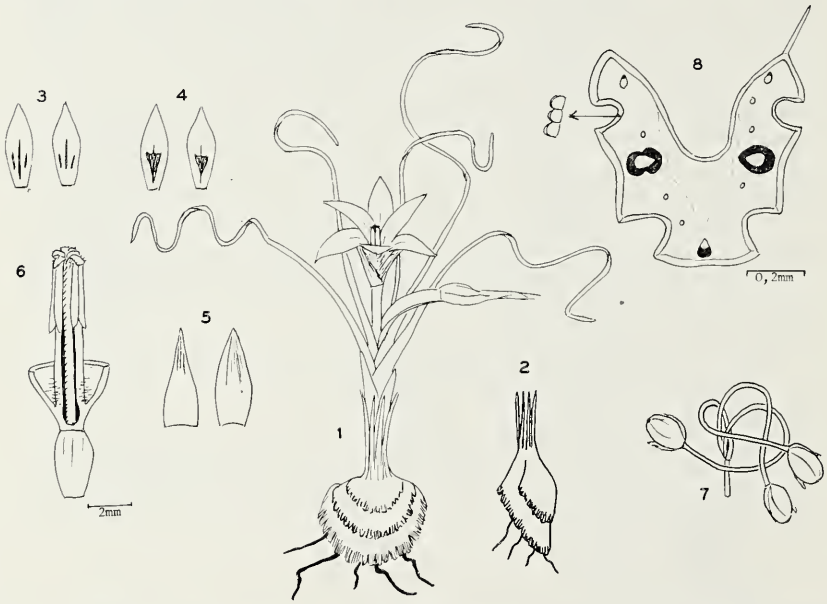


FIG. 47.

R. tortuosa spp. *depauperata* (*de Vos* no. *2125*). 1, plant at least three years old ×1. 2, side view of corm. 3, 4, outer and inner perianth segments, upper surfaces, of two plants. 5, bract and bracteole ×1. 6, pistil, stamens, and perianth tube. 7, mature capsules ×1. 8, transverse section of leaf.

WORCESTER. Near Matroosberg station: *Loubser 2017* (NBG). Road Matroosberg station—Koo: *de Vos 2099*. Aan de Doorns: *van Breda & Joubert 1887* (PRE).
LAINGSBURG. Matjiesfontein: *de Vos 1796*. Tweedside: *de Vos 1797*.
WITHOUT LOCALITY. *Leipoldt* June 1935 (BOL).

Flowering period July to August.

On stony ground.

This subspecies is clearly allied to subspecies *tortuosa*, differing in its paler, smaller flowers, with the perigone tube proportionally longer than in subspecies *tortuosa*, and the filaments not widened at their bases. In the Cold Bokkeveld the two subspecies occur together, but there is no indication of hybridisation taking place.

33. **Romulea sphaerocarpa** De Vos sp. nov.

Fig. 35, 48.

Cormus 8—18 mm latus, latere uno oblique complanato, altero convexo, crista lata flabellata, tunicis rigidis laevibus brunneis, fibrillis in crista tenuibus parallelis irregulariter aggregatis, apice fibris 8—12 mm longis praedito. *Caulis* brevis, obtectus, post anthesin ad 40 mm elongatus. *Vagina basilaris* plerumque 1. *Folium* 1 (raro 2) basilare filiforme terete, 15—30 cm longum ca. 1 mm diam., curvatum vel suberectum, arenis adhaerentibus, glabrum, sulcis angustis, pagina adaxiali operta ad 50—60 mm ab apice, basi vaginanti angusta. *Pedunculus* 20—40 mm longus, semiteres in dimidio inferiore, suberectus rufus. *Bractea* rubiginosa, aliquando viridis in dimidio superiore, marginibus perangustis, fere anguste triangularis, arenis adhaerentibus, 15—18 mm longa, obtusa vel acuta vel emarginata. *Bracteola* rubiginosa vel interdum viridis in dimidio superiore, nervis laxis, marginibus latis membranaceis plerumque incoloratis. *Flos* 1 (raro 2) 25—35 mm longus. *Tubus perigonii* 5—6 mm longus, infundibularis; *segmenta* elliptica vel anguste elliptica, 15—25 mm longa 5—12 mm lata obtusa vel acuta vel emarginata, lutea, in fauce brunneo-nervata, segmenta exteriora a dorso brunneola vel luteola vel nervis brunneolis longitudinalibus et pinnatis praedita. *Stamina* in dimidio tubi perigonialis inserta, lutea; *filamenta* 5—7 mm longa, basibus parum dilatata et dense pilosa; *antherae* 6—8 mm longae, aliquanto patentes, basibus interdum sagittatae. *Stylus* 10—14 mm longus; *stigmata* 2 mm longa, antheras superantia vel apices antherarum non attingentia. *Capsula* sphaerica 6—10 mm diam., in pedunculo arcuato ad 60 mm elongato.

Holotype: *de Vos 2102* in STE.

Plants 15—30 cm tall. *Corm* 8—18 mm wide, obliquely flattened on one side and convex on the other, with a wide fan-shaped ridge separating the two faces; tunics hard, smooth, brown, with rows of fine parallel fibrils irregularly grouped on the ridge, and apical fibres 8—12 mm long. *Stem* short and hidden, elongating


4
2mm
2
3
1
5
6
0,2mm

up to 40 mm after flowering. *Basal sheath* mostly 1, 20—60 mm long. *Leaf* 1, rarely 2, basal, filiform, terete, 15—30 cm long, ca. 1 mm diam., bent or suberect, with adhering sand grains, glabrous, grooves narrow, the adaxial groove open up to 50—60 mm from the tip, sheathing leaf base narrow. *Peduncle* 20—40 mm long, semiterete in lower half, suberect, reddish. *Bract* purplish-brown, sometimes green in upper half, with very narrow membranous margins, almost narrowly triangular, with adhering sand grains, 15—18 mm long, obtuse, acute or emarginate. *Bracteole* purplish-brown or sometimes green in upper half, with widely spaced veins and with wide, mostly colourless, membranous margins. *Flower* 1, rarely 2, 25—35 mm long. *Perigone tube* 5—6 mm long, funnel-shaped; *segments* elliptical, or narrowly elliptical, 15—25 mm long, 5—12 mm wide, obtuse or acute or emarginate, golden-yellow, with 3—5 slender brownish veins in the throat, outer segments brownish or yellowish on the backs or with 5 brown longitudinal veins and fine feathered veining in between. *Stamens* inserted halfway up the perigone tube, golden-yellow; *filaments* 5—7 mm long, somewhat widened and densely pilose at the bases; *anthers* 6—8 mm long, slightly patent, sometimes sagittate at the bases. *Style* 10—14 mm long; *stigmas* 2 mm long, reaching below the anther tips or higher than the anthers. *Capsule* spherical, 6—10 mm diam., on an arcuate peduncle which elongates up to 60 mm. *Chromosome number* 2n = ca. 30, 32 (*de Vos 2102*).

WORCESTER. Near Matroosberg Station: *Stayner* June 1970 (NBG).
MONTAGU. Sandvlei, 14 mls. from Matroosberg station on road to Koo: *de Vos 2102, 2191.*
Locally abundant in sandy pockets on northern slope of stony ridge.

Flowering period June.

This rare, early flowering species, discovered in 1967 in the south-western Karoo, apparently has a very local distribution, and shows a combination of characters which is rather unique in the genus: it usually has a single foliage leaf with sand grains adhering to some mucilage it exudes; the bract and bracteole also excrete mucilage; it is further characterised by a spherical capsule, a corm with a wide, fan-shaped ridge, and generally by a single flower, yellow in colour. The corm, yellow flower, largely bifacial leaf, and chromosome number indicate relationships with the *Tortuosae*, with which the species has been placed.

Variation occurs in the width of the perianth segments and length of style.

2.2 Subsection Longitubae De Vos subsect. nov.

Section *Macowania* De Vos nom. nud. 1970c p. 283.

Flores magni infundibulares lutei. *Tubus* perigonii pro parte majore tubularis sursum dilatatus 15—65 mm longus, segmenta subaequans vel segmentis ad 2-plo longior. *Stamina* in parte dilatata tubi perigonialis inserta.

Fig. 48.

R. sphaerocarpa (*de Vos* no. *2159*). 1, plant at least three years old ×1. 2, outer and inner perianth segments, lower surface. 3, bract and bracteole ×1. 4, pistil, stamens, and perianth tube. 5, mature capsule ×1. 6, transverse section of leaf.



FIG. 49.
R. macowanii (*de Vos* no. *2258*). 1, plant ×1. 2, part of perianth. 3, pistil, stamens and perianth tube. 4, bract and bracteole ×1. 5, mature capsules ×1. 6, transverse section of leaf.

Type species: *R. macowanii* Bkr.

Leaves several, suberect or bent, bifacial for most of their length, glabrous. *Peduncles* often subterranean. *Bract* and *bracteole* 20—60 mm long. *Flowers* 25—105 mm long, yellow without dark blotches, orange-yellow in the cup. *Perigone tube* 15—65 mm long, narrow and tubular for most of its length, widened towards the top. *Stamens* inserted in the widened part of the perigone tube.

Leaf anatomy. Bifacial and conduplicate for the greater part of the length, unifacial in the upper quarter. Further as described for the section.

The single species comprising this subsection differs from most other species of *Romulea* in its long perianth tube, and from the subgenus *Lomurea* which also has long perianth tubes, in its funnel-shaped, yellow flowers. In shape the flower resembles that of the genus *Crocus*, but in all other features the species is typical of *Romulea*.

Béguinot (1909) placed *R. macowanii* in his stirps *Bulbocodioidis* because of its somewhat membranous bracteole and yellow flower. But the difference between this species and other species of the stirps *Bulbocodioidis* is too great to corroborate this opinion.

34. **Romulea macowanii** Bkr. J. Bot. 14: 236 (1876), sensu amplo.

Plants 20—40 cm tall. *Corm* obliquely flattened on one side, with a small, fan-shaped ridge across the base, 8—15 mm diam.; tunics somewhat hard, smooth, or irregularly torn, brown, with short parallel fibrils on the basal ridge, and apical fibres and teeth 5—15 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* 1—2, 20—60 mm long. *Leaves* 3—6, basal, filiform, 15—40 cm long, 0,6—1 mm diam., curved or suberect, grooves narrow, sheathing leaf bases ca. 6 mm wide. *Peduncles* 10—80 mm long, subterranean or extending slightly above-ground, suberect. *Bract* green or greenish in the upper part or towards the tip, submembranous below, narrowly triangular, 20—60 mm long, acute to acuminate. *Bracteole* somewhat more membranous, sometimes with wide white membranous margins, tip green. *Flowers* 1—3, 22—105 mm long. *Perigone tube* 20—65 mm long, or sometimes only 13 mm, narrow and tubular for most of its length, widening in the upper centimetre, and funnel-shaped; *segments* narrowly obovate or elliptical, 15—45 mm or sometimes only 10 mm long, 5—15 mm wide, acute to obtuse, golden-yellow (RHS 13B, C), often orange-yellow in the lower half, outer segments on the backs often brownish or tinged with purple or striped with reddish feathered veining. *Stamens* erect, inserted in the perigone tube where it widens, yellow; *filaments* 5—10 mm long, sparsely pilose near the bases or glabrescent; *anthers* 5—12 mm long. *Style* 25—70 mm long, rarely shorter; *stigmas* at or below the anther tips or some-

times up to 5 mm higher. *Capsules* ellipsoid, 10—12 mm long, on recurved peduncles when mature.

Lectotype: *MacOwan 1547* in K. Isotypes in BOL, GRA, PRE, SAM, BM, G, Z, etc.

This species occurs on inland plateaux and mountains at high altitudes and is widely distributed in the eastern Karoo and midlands of the Cape Province, with outliers as far west as Fraserburg and north as Philippolis and Lesotho. It is readily distinguished by its golden-yellow perianth with a long, narrow perianth tube subequal to the segments or up to twice as long as the segments, by its corm with an almost vertical ridge across the base, and by its very short stem hidden by the leaf sheaths.

Variation occurs in flower size and especially in the length of the perianth tube, the perianth segments, and style; the lengths of style and perianth tube are correlated.

The typical variety of *R. macowanii*, with perianth tubes 15—33 mm long and generally slightly shorter than the segments, or sometimes equal to or slightly longer, and segments 10—15 mm wide, occurs on plateaux up to 2 000 m in altitude.

R. longituba, known until recently only from Tyson's collection no. 1267 found on the summit of Mt. Ingele, was made a distinct species on account of its extremely elongated perianth tube. Specimens collected later (*Schurr 5* and *Milford* s.n.) have shorter tubes intermediate between *R. longituba* and *R. macowanii*, and it has become more difficult to separate the two species. *R. longituba* and its variety *alticola* are therefore incorporated with *R. macowanii* as var. *alticola*, this being the legitimate epithet. This variety has its perianth tube 35—65 mm long and about twice the length of the perianth segments.

Another group of high altitude plants which differ from the typical variety in having all their floral parts somewhat smaller, is made a separate variety, *oreophila*. This has perianth tubes from 13 to 27 mm long, varying from slightly shorter to slightly longer than the perianth segments which are generally smaller than in the typical *R. macowanii* (see also Fig. 50).

The length of the peduncle and position of the ovary, above ground or below ground level, have been suggested as possible distinguishing features to separate the varieties. But this varies and is influenced to some extent by the light intensity of the environment. In the typical *R. macowanii* the ovary is often borne above ground or at ground level, but in a considerable number of collections, especially of plants found growing in full sunlight in the open, such as *de Vos 2258*, the ovary is underground. In var. *oreophila* the ovary is usually below ground or at ground level, but a plant of the *de Vos 2186* collection, grown in the Stellenbosch botanical garden in too little light, formed a long

peduncle bearing its flower several centimetres above the soil level. The length of the peduncle is therefore not always inversely proportional to the length of the perianth tube. Furthermore, as it is rather difficult to determine the length of the peduncle in herbarium specimens, this character has not been used as a distinguishing feature.

Although flower size is genetically fixed, it may become modified to some extent by environmental factors in var. *alticola* and var. *oreophila*, and possibly also in the typical variety. For instance, the *Dyer and Collett* specimens no. *4720* collected in 1946 on Naudésnek have flowers 45 to 58 mm long, whereas the *de Vos 2186* specimens collected in the same locality in a dry season after several years of severe drought, have flowers 33 to 43 mm long. Some of the *Schurr* plants, also collected after years of drought, have much smaller flowers than *Tyson's* collection no. *1267* from the same locality, and connect *R. longituba* and its variety *alticola*.

The flowering period varies greatly and probably depends largely on the rainfall.

KEY TO THE VARIETIES

1 Perigone tube up to 33 mm long, as long as the segments or slightly shorter or longer, or rarely to 1,5 times the length of the segments, but flowers then less than 50 mm long; bract and bracteole reaching higher than the bases of the perianth segments or sometimes slightly below the bases.
 2 Flowers 55 mm long or longer, rarely only 45 mm; perianth segments 8—15 mm wide; style 30—50 mm long; bases of flower and bract sometimes above-ground. a. Var. *macowanii*
 2 Flowers generally less than 55 mm long, rarely up to 60 mm; perianth segments 4—7 mm wide; style up to 30 mm long, rarely to 32 mm; bases of flower and bract often below ground level c. Var. *oreophila*
1 Perigone tube 35—65 mm long, about twice as long as the segments, rarely only 1,7 times the length of the segments, but flowers then 60 mm long or longer; bract and bracteole reaching halfway to three-quarters up the perianth tube b. Var. *alticola*

a. Var. **macowanii.**

R. macowanii Bkr. J. Bot. 14: 236 (1876), et 1877 p. 88 et 1892 p. 101 et 1896 p. 38; Klatt 1895 p. 165; Béguinot 1907b p. 116 et 477 et 1909 p. 113; Lewis 1941 p. 57; Burtt 1967 sub t.515.

Bulbocodium macowanii (Bkr.) Kuntze 1891 p. 700.

Syringodea luteo-nigra Baker 1897 p. 281—type: *Galpin 1516* (K holo, PRE).

Icones: Gard. Chron. Ser. 3, 1: 180 fig. 42 (1887); ibid. Ser. 3, 58: 35 fig. 11 (1915); this work Fig. 49.

Bract and *bracteole* green in the upper half or three-quarters, submembranous in the lower, the bracteole often with wide, white membranous margins. *Flowers* 45—80 mm long. *Perigone tube* 14—33 mm long; *segments* 25—45 mm long, 8—15 mm wide. *Style* 30—50 mm long.

FRASERBURG. *Rossouw STE 8902.*
HANOVER. 15½ mls. W by N of Noupoort: *Acocks 14294* (PRE).

NOUPOORT. *Rogers 27690* (BOL). Kleinfontein near Noupoort: *Denoon 39* (BOL).
MIDDELBURG. Sneeuberg: *Henrici 7* (PRE). Seekoe River Vlei above The Poplars farm: *Archibald 3117* (GRA). Roodehoogte: *de Vos 2258*.
GRAAFF-REINET. Mountain top Oudeberg: *Bolus 592* (BOL).
MOLTENO. *Sim 4069* (GRA), *20393* (PRE).
SOMERSET EAST. *Bowker* s.n. (K). In graminosis summi montis Boschberg: *MacOwan 1547*. Top of Bosberg: *de Wet 307* (PRE).
QUEENSTOWN. Summit of Andriesberg and of Hangklip: *Galpin 1516* (BOL, PRE, K).
CATHCART. Elandsberg summit, 10 mls. NE of Seymour: *Story 3783* (PRE). Rocklands farm: *Noel 989* (GRA, *RUH 7864*), *Johnson 1295* (GRA, PRE, K).
ALBANY. Atherstone near Grahamstown: *Long* s.n. (BOL).
KEISKAMMAHOEK—KING WILLIAM'S TOWN border. Mt. Kemp: *Archibald & Rhodes U.C. Biol. Exp. RUH 212*.
O.F.S.: PHILIPPOLIS. Joachimsfontein: *Fourie BLFU 3332* (PRE, C).
LESOTHO. Phutha: *Compton 21586* (NBG).
WITHOUT LOCALITY. Ex hb. *Prior* sub *Trichonema sublutea* (K).

Flowering period: generally March to May, sometimes also February, August and September, probably depending on the rains.

Widely distributed in the Karoo, generally at altitudes of 1 500—2 000 m.

b. Var. **alticola** (B. L. Burtt) De Vos comb. nov.

R. longituba L. Bolus, S. Afr. Gard. & Country Life 18: 341 (1928)—type: *Tyson 1267* (SAM, GRA); Burtt 1967 sub t. 515 et 1970 p. 85. *R. longituba* G. J. Lewis 1941 p. 43 sub eodem typo et 1948 p. 89: non *Trichonema longitubum* Klatt. *R. longituba* L. Bol. var. *alticola* Burtt 1967 t.515 basionym; Hilliard & Burtt 1970 p. 126.

J. Roy. Hort. Soc. 88: 37 (1963) sub *Syringodea luteo-nigra*.

Icon: Bot. Mag. 176 t. 515.

Bract and *bracteole* herbaceous or membranous in the lower half, 20—60 mm long, green towards the tip, the bracteole with membranous margins in the lower half (sec. Bolus). *Flowers* 55—105 mm long. *Perigone tube* 35—65 mm long; *segments* 15—35 mm long, ca. 4—10 mm wide. *Anthers* 5—8 mm long. *Style* 35—70 mm long; *stigmas* at the anther tips or slightly higher or lower.

Type: Burtt (1967) did not indicate the type of var. *alticola*. In a private communication he indicated it as the plant illustrated in Bot. Mag. t.515 and preserved in the Kew herbarium. This is *Milford* s.n. cult. by Stern.

GRIQUALAND EAST. Mt. Ingele: *Tyson 1267* (SAM, GRA), *Schurr 5* (UN, STE).
LESOTHO. *Milford* s.n., cult. Stern 9/10/1963 and Edinb. B.G. 66/2380.

Flowering period March.

Grassy places on the summit of Mt. Ingele at 2 200 m and in Lesotho.

This rare variety has the longest perianth tube in the genus, and differs from the other varieties of *R. macowanii* in its tube which is twice, or nearly twice as long as the segments, and in its longer style, bract and bracteole.

It has been found only three times: by Tyson in 1883, by Schurr who rediscovered it in the same locality in 1969, and in Lesotho by Mrs. Milford.

The Schurr plants were collected after a long period of drought and some of the flowers are smaller than in Tyson's collection, thus connecting the latter with the Lesotho plants on which Burtt based his variety *alticola*. Burtt stated (Hilliard and Burtt 1970) that he would not have proposed a new variety for the Lesotho plants had he known that *longituba* varied so much.

c. Var. **oreophila** De Vos var. nov.

R. longituba L. Bol. var. *alticola* B. L. Burtt 1967: 515 pro parte, typus excl.

A typica omnibus partibus florum brevioribus, segmentis perigonii angustioribus distinguitur.

Holotype: *de Vos 2186* in STE.

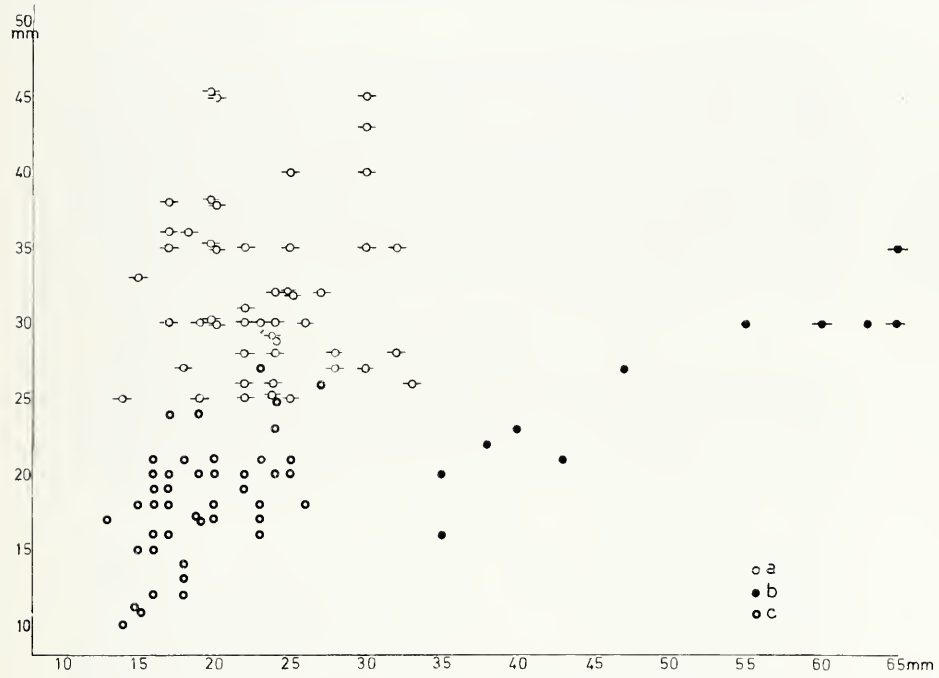


FIG. 50.

R. macowanii. Scatter diagram illustrating the variation in length of the perianth tube (horizontal axis), perianth segments (vertical axis), and width of the segments, in all the specimens available for each variety. The varieties are represented by different symbols—cf. key in lower right corner: a = var. *macowanii;* b = var. *alticola;* c = var. *oreophila*. Segments 8—12 mm wide or wider are indicated by horizontal lines radiating from the dot or circle concerned; absence of a horizontal line indicates segments 4—7 mm wide.

This differs from the typical variety in the following respects: *bract* and *bracteole* white and membranous in the lower half, green towards the tips. *Flowers* 27—58 mm long. *Perigone tube* ca. 13—27 mm long; *segments* 10—25 mm, rarely up to 30 mm long, 4—7 mm wide. *Style* 18—32 mm long. *Chromosome number* 2n = ca. 32 (*de Vos 2186*).

MOLTENO. Molteno-Jamestown road at Buffelsfontein: *Moss 16793* (BM, K).
STERKSTROOM—MOLTENO. *Muir* s.n. (PRE).
BARKLY EAST. Drakensberg on Doodmanskrans, 9 000 ft.: *Galpin 6848* (BOL, SAM, PRE, K).
BARKLY EAST—MACLEAR BOUNDARY. Naudésnek, summit of road: *Dyer & Collett 4720* (PRE), *de Vos 2186*. Naudésnek, 13 mls. NE of Rhodes: *Marais 1367* (PRE, K).
VICTORIA EAST. Hogsback upper plateau: *Martin STE 30310*.
LESOTHO. Mokhotlong, top of pass, 8 000 ft.: *Guillarmod 978* (PRE).

Flowering period January to March.

An alpine variety occurring in the north-eastern Cape Province and Lesotho, mostly at altitudes of 2 400 to 2 700 metres.

Several collections of this variety were cited by Burtt under *R. longituba* var. *alticola*, but they differ from this in their much shorter styles and perianth tubes, the latter being more or less subequal to the segments. They resemble the typical variety of *R. macowanii* in these features, but the perianth segments are generally smaller. They stand nearer the typical *R. macowanii* than to var. *alticola* (Fig. 50), and are connected with the typical variety by some intermediates, e.g. some plants of *Dyer and Collett 4720*.

3 Section Aggregatae De Vos sect. nov.

Cormus campanulatus basi planus crista basilari circulari, vel basi oblique complanatus crista basilari lunata praeditus, tunicis in fasciculis fibrillarum minutarum in crista basilari fissis. *Caulis* brevis vel aliquanto elongatus. *Folia* filiformia. *Flores* magni ad parvos, varie colorati. *Tubus perigonii* brevis. *Stamina* erecta, prope basin vel in dimidio tubi perigonialis inserta.

Type species: *R. setifolia* N.E. Br.

Corm symmetrical and bell-shaped with a circular basal ridge, or obliquely flattened towards the base with a crescent-shaped basal ridge; tunics split into row(s) of small clusters of minute fibrils on the basal ridge. *Stem* short or somewhat elongated. *Leaves* filiform, ca. 1 mm or rarely up to 2 mm diam. *Bract* green or sometimes submembranous. *Bracteole* with wide membranous margins. *Flowers* large to small, variously coloured. *Perigone tube* short, funnel-shaped. *Stamens* erect, inserted near the base or middle of the perigone tube.

Leaf anatomy. Upper half unifacial, 4-grooved and 4-ribbed. Each rib with one, or a large and 2—4 small vascular bundles, with sclerenchymatic

bundle sheaths against the epidermis, or separated from it by the parenchymatic bundle sheaths. Rib margins glabrous or with white hairs, without fibres, sometimes with an unlignified, thick-walled, multiseriate epidermis. Epidermal cells on the ribs with thick outer cell walls, and in the grooves mostly without papillae or with rudimentary papillae. Styloids scattered in the mesophyll and (or) in the parenchymatic bundle sheaths; short crystals absent.

In both subsections of this section the corm tunics split into small, or slightly elongated, groups of minute fibrils on the basal ridge on the corm. Roots extend from the centres of several of these fibril clusters. The chromosome numbers of the subsections differ, and it is not clear to what extent the subsections are related. *R. sanguinalis*, however, seems to form a morphological link between them.

3.1 Subsection Aggregatae

Corm obliquely flattened towards the base with a crescent-shaped or horseshoe-shaped basal ridge; tunics split into row(s) of minute or slightly elongated fibril clusters. *Stem* elongated, sometimes seemingly dichotomously branched near the top, or sometimes short and hidden. *Basal leaves* 1—2 in long-stemmed forms, terete or rarely somewhat 4-angled (*R. dichotoma*). *Peduncles* remaining erect or sometimes becoming curved in fruiting specimens. *Bract* green or purplish. *Bracteole* with wide membranous margins and green or scarious tip. *Flowers* large to small, variously coloured. *Stamens* inserted near the base of the perigone tube; *anthers* sometimes joined at their tips in young flowers.

Leaf anatomy. As described in the section.

The species of this subsection occur mainly in the southern inland and coastal districts, from Ceres and Worcester to East London. They are excluded from the Cape peninsula and neighbouring districts. Some of the species have a wide range and others, e.g. *R. albomarginata* and *R. jugicola*, are seemingly very local in their distribution.

This subsection can be divided into two groups of species: (1) with anthers not joined at their tips, stems generally short, and with the epidermis on the margins of the leaf ribs showing a tendency to become multiseriate (*R. setifolia*, *R. albomarginata*); and (2) with the anthers in the young flowers joined at their tips, stems usually elongated, and with a single-layered epidermis on the margins of the leaf ribs (*R. longipes*, *R. fibrosa*. *R. jugicola*, and *R. dichotoma*).

35. **Romulea setifolia** N.E. Br. Gard. Chron. 92: 467 (1932).

Plants 5—25 cm tall, rarely taller. *Corm* 3—10 mm diam., obliquely flattened towards the base with a small crescent-shaped basal ridge which sometimes forms an almost complete circle; tunics hard, mostly minutely pitted, brown, with rows of minute fibril clusters on the basal ridge, and apical fibres mostly

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3—5 mm long. *Stem* short and hidden by leaf bases, or sometimes up to 120 mm long, shortly extending, erect, elongating slightly in fruiting specimens. *Basal sheaths* 1—2, up to 40 mm long. *Basal leaves* 2, or seemingly all basal in short-stemmed forms, filiform, 5—25 cm long, 0,5—1,5 mm diam., suberect or bent, grooves narrow, sheathing leaf bases 1—5 mm wide; *cauline leaves* shorter than the basal leaves. *Peduncles* 10—80 mm long, rarely longer, semiterete. *Bract* green, often with very narrow membranous margins, narrowly ovate, 8—25 mm long, obtuse to acute, often reaching high up the perigone. *Bracteole* green with white or rarely brown-edged membranous margins, sometimes slightly shorter than the bract. *Flowers* 1—4, mostly 15—45 mm long, rarely longer. *Perigone tube* 3—7 mm long, funnel-shaped: *segments* narrowly obovate to elliptical, 8—35 mm long, 2,5—10 mm wide, acute to obtuse, yellow or sometimes apricot-yellow, sometimes with dark blotches in the throat. *Stamens* erect, yellow or orange; *filaments* minutely pilose near base, narrowing upwards; *anthers* 2—8 mm long. *Style* 8—14 mm long; *stigmas* 1—3 mm long, more or less at the anther tips. *Capsules* ellipsoid, ca. 10 mm long, on peduncles which remain erect or suberect.

Holotype: *Muir 4847* in K. Isotype in PRE.

Flowering period July to September, or to November at higher altitudes.

Morphologically the four varieties form a group readily distinguished by a fairly short stem not or rarely extending from the sheathing leaf bases, corm with minute groups of fibrils on a crescent-shaped basal ridge, bracteoles mostly with colourless margins, and by yellow or sometimes apricot-yellow flowers mostly without dark blotches, except for the variety *ceresiana* which has dark blotches in the throat.

The two varieties *aggregata* and *ceresiana* differ from the typical variety in their larger flowers with the perianth segments proportionally longer in relation to the tube, and in the stamens not reaching very high up the perianth. The varieties occur in somewhat overlapping geographical areas.

It is not always easy to distinguish the variety *aggregata* from the typical variety. Several collections here cited under var. *aggregata*, namely *Esterhuysen 9249*, *15690*, and *18688* in BOL, and *Zeyher 4046* in G, have specimens intermediate in size; for this reason var. *aggregata* has not been made a separate species.

The diploid chromosome number for the species is probably 30. Counts of 32 were obtained, perhaps after fragmentation of a few chromosomes after a too drastic treatment in paradichlorobenzine. One collection of the typical variety was found to be polyploid with ca. 54 chromosomes (possibly 60?). There were no morphological differences discernible between polyploid and diploid specimens, except that the former were slightly smaller than the diploids.

KEY TO THE VARIETIES

1 Perigone without dark blotches in the throat.
 2 Flowers 15—25 mm long; perigone segments less than 6 mm wide; bract reaching more than halfway up the perigone; anthers shorter than the filaments, usually reaching more than halfway up the perigone.
 3 Seeds not sticky; flowers usually yellow, sometimes apricot-yellow. . a. Var. *setifolia*
 3 Seeds somewhat sticky when dry; flowers apricot-yellow . . . b. Var. *belviderica*
 2 Flowers 25 mm or more in length; perigone segments usually 6—10 mm wide; rarely only 5 mm; bract seldom reaching more than halfway up the perigone; anthers subequal to the filaments or very slightly shorter, sometimes reaching halfway or higher up the perigone c. Var. *aggregata*
1 Perigone with a dark blotch on each segment in the throat d. Var. *ceresiana*

a. Var. **setifolia**

R. setifolia N. E. Brown 1932 p. 467.

Fig. 51.

Corm 3—8 mm diam., with the tunic surfaces minutely and closely pitted (visible with a lens). *Stem* usually short and hidden, or sometimes up to 50 mm long. *Leaves* less than 1 mm diam. *Peduncles* 10—50 mm long. *Bract and bracteole* 8—20 mm long, reaching more than halfway or almost to the tips of the perigone segments. *Flowers* 12—25 mm long. *Perigone segments* 2,5 to almost 6 mm wide, apricot-yellow, golden-yellow, or pale yellow, cup yellow, outer segments olive or reddish-brown on the backs. *Stamens* 6—10 mm long, usually reaching more than halfway up the perigone; *anthers* 2—3 mm long or rarely up to 5 mm, shorter than the filaments. *Stigmas* ca. 1 mm long. *Seeds* not glutinous. *Chromosome number* 2n = 30 (*de Vos 1931*); ca. 54 (*de Vos* 1577).

CERES. 40 mls. from Ceres, towards Touwsrivier: *de Vos 2124.*

SUTHERLAND. Klein Roggeveld, 38 mls. from Matjiesfontein towards Komsberg: *de Vos 1931.*

CALEDON. Swartberge near Baths: *Ecklon & Zeyher 203* partly (SAM, G, P, S), *Zeyher 4046* (partly in K, not in BOL, PRE). Eastern slopes of Hottentots Holland: *Acocks 2183* (S).

BREDASDORP. Nachtwacht: *Smith 2973* (PRE).

RIVERSDALE. *Fergusson* Aug. 1927 (BOL), *Rogers 16759* (Z). Near Riversdale: *Muir 2734* (BOL). Albertinia: *de Vos 1577.* Botteliersfontein: *Muir 996* (BOL), *Marloth 5573* partly (PRE). Oude Tuin: *Muir 16759* (GRA). The Fisheries: *Acocks 21349* (NBG, PRE). Kampsberg, Langeberge: *Muir 3334* (STE).

MOSSEL BAY. Gouritz River: *Muir 4847* (PRE, K).

HUMANSDORP. Clarkson: *Galpin 4657* (PRE).

PORT ELIZABETH. *Paterson 2138* (GRA). Near P.E.: *Drège 8451* partly (S), *Fries, Norlindh & Weimarck 454* (S). Waterkloof near Green Bushes: *Holland* 3633 (BOL). Paton's farm, Bakens River: *Long, Fl. E. Cape 472* (PRE, K). Bakens River valley: *Long, Fl. E. Cape 1450* (PRE).

b. Var. **belviderica** De Vos var. nov.

A varietate typica seminibus glutinosis praecipue differt.

Holotype: *Duthie 1246* in STE.

Flowers apricot-coloured, ca. 25 mm long; *segments* 5—6 mm wide, generally subobtuse. *Seeds* glutinous when dry. Further as in var. *setifolia. Chromosome number* 2n = 30 (*de Vos 2073*).

KNYSNA. Belvidere, among shrubs: *Duthie 1246.* Belvidere common: *de Vos 2073.*

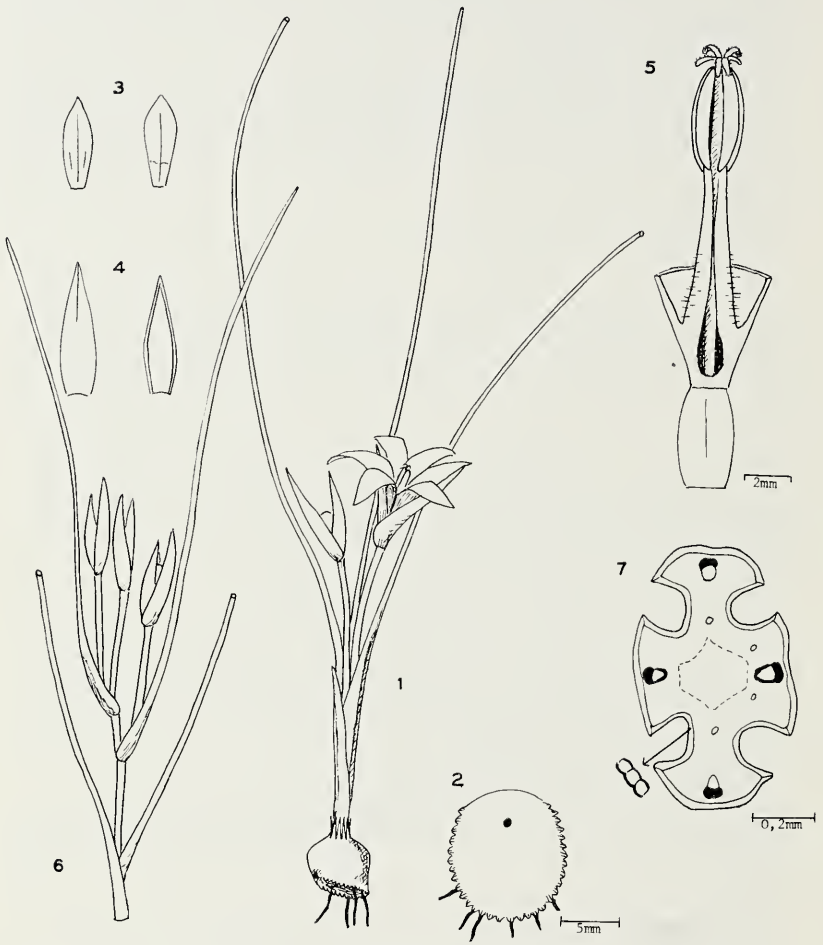


FIG. 51.

R. setifolia var. *setifolia* (*de Vos* no. *1577*). 1, plant ×1. 2, base of corm. 3, outer and inner perianth segments. 4, bract and bracteole. 5, pistil, stamens, and perianth tube. 6, ripening capsules ×1. 7, transverse section of leaf.

At first it was thought that the Belvidere plants could be included with the typical variety. As there is now evidence of a reproduction barrier between these two groups (see Experimental Hybridisation), the Belvidere plants are placed in a distinct variety. This means that some herbarium specimens without seeds and with apricot-yellow flowers and subobtuse perianth segments, can, unfortunately, not be identified, as these floral characteristics sometimes also occur in var. *setifolia*.

c. Var. **aggregata** De Vos var. nov.

Omnibus partibus majoribus, perigonio luteo vel armeniaco sine maculis fuligineis, sed aliquando nervis fuligineis in fauce, filamentis antheras subaequalibus, staminibus stigmatibusque plerumque non dimidium perigonii attingentibus, distinguitur.

Holotype: *de Vos 1276* in STE.

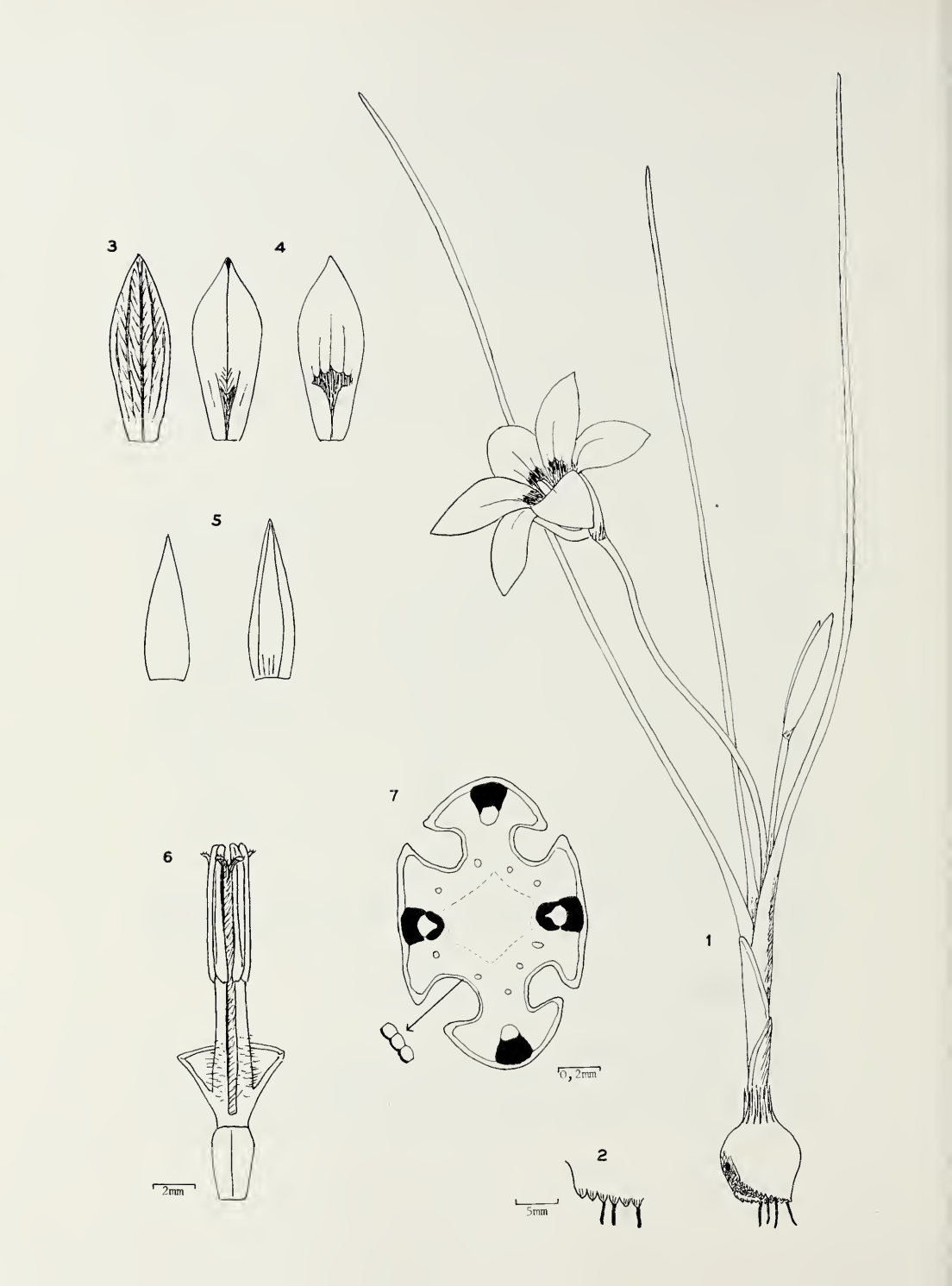
Corm up to 10 mm diam., with surface of tunics minutely pitted. *Stem* short or sometimes up to 120 mm long. *Leaves* 1 to rarely 2 mm diam. *Peduncles* 30—80 mm long. *Bract* and *bracteole* 12—25 mm long, hardly reaching halfway up the perigone, or sometimes slightly higher. *Flowers* 25—45 mm long. *Perigone segments* 6—10 mm wide, golden-yellow or sometimes pale apricot (RHS 19B, 29C, 37D), sometimes with dark or apricot-coloured veins in the throat, cup bright yellow, outer segments sometimes narrowly elliptical, yellow or brownish or brownish-veined on the backs, sometimes with small dark markings on each side at the bases. *Stamens* 10—15 mm long, sometimes reaching halfway or higher up the perigone; *anthers* subequal to filaments or slightly longer. *Stigmas* 2—3 mm long. *Seeds* not glutinous. *Chromosome number* 2n = ca. 30, 32 (*de Vos 1885*, *1886*).

CALVINIA. Along Nieuwoudtville—Calvinia road: *de Vos 2087*.
CERES. Wolseley, Breede River valley: *Marloth 9084* (PRE, STE). Two mls. E of Hotnotskloof: *de Vos 1674*. Between Theronsberg Pass and Karoopoort: *de Vos 1885*. Swaarmoed Pass: *de Vos 2199*.
TULBAGH. Tulbagh Road Station: *Guthrie 3013* (NBG).
WORCESTER. Stettyn: *Leipoldt 3544* (BOL, PRE). Stettynskloof: *Barker 9457* (NBG). Orchard: *Esterhuysen 10291* (BOL). Keeromsberg, cliffs below summit: *Esterhuysen 9249* (BOL). Du Toitskloof: *Esterhuysen 15690* (BOL). Hex River Valley: *Esterhuysen 18688* (BOL). Near Breede River bridge, NE of Bainskloof: *de Vos 1276*, *1886*. Foot of Bainskloof: *Walters 174* (NBG). San Sebastian Kloof: *Stokoe SAM 63690*. Between Brandvleidam and Rawsonville: *de Vos 2113*.
SWELLENDAM. Hill below Crown Mt.: *Wurts 302* (NBG).
HEIDELBERG. Palmyra, Langeberge: *Loubser 2132* (STE).
WITHOUT LOCALITY. *Zeyher 4046* partly (G).

d. Var. **ceresiana** De Vos var. nov.

Fig. 52.

A typo omnibus partibus majoribus, segmentis perigonii in fauce maculis fuligineis medianis praeditis, filamentis antherisque subaequalibus, staminibus


3
4
5
6
7
1
2
2mm
0,2mm
5mm

et stigmatibus plerumque non dimidium perigonii attingentibus, facile distinguitur.

Holotype: *de Vos 1676* in STE.

This variety is almost similar to var. *aggregata*, differing in the occurence of a larger or smaller, dark, median blotch near the base of each segment, from which a slender, dark line runs down into the orange-yellow cup, and in the possession of slightly more xeromorphic leaves, with smaller epidermal cells, and rib margins somewhat strengthened by a thick-walled epidermis. The yellow colour of the perianth tends to fade in herbarium specimens left in the light. The shallow pitting on the corm tunics, so evident in the typical variety, is mostly absent in this variety, except in *de Vos 2093*, where pitting is to be seen. *Stem* short, not extending from the leaf bases. *Chromosome number* 2n = 30 (*de Vos 1883*).

CERES. Flats W of Theronsberg Pass: *de Vos 1676*. Top of Theronsberg Pass: *De Vos 1672, 1883*. 10 mls. NE of Gydouw: *de Vos 1573*.
WORCESTER. Road to Matroosberg Station: *de Vos 2093*.
LAINGSBURG. West of Konstabel: *Oliver 3475* (STE).

The flower of var. *ceresiana* resembles that of *R. montana*, but the variety is readily distinguished from *R. montana* by its corm with its small fibril clusters on the basal ridge, and by its bracteole with colourless membranous margins.

36. **Romulea albomarginata** De Vos sp. nov.
Fig. 53.

Cormus 7—10 mm diam., basi oblique complanatus crista lunata, tunicis rigidis laevibus brunneis, fibrillis minutis fascicularibus in crista basilari, apice fibris 5—10 mm longis praedito. *Caulis* brevis vel ad 50 mm longus, plerumque non supra vaginas foliorum exsertus. *Vagina basilaris* 1. *Folia basilaria* 2, vel apparenter plura in plantis brevicaulibus, filiformia, 12—25 cm longa, ad 1 mm diam., sulcis angustis, basibus vaginantibus 2—3 mm latis; *folia caulina* 1—2, breviora. *Pedunculi* 20—50 mm longi, semiteretes. *Bractea* viridis vel purpurascens, marginibus membranaceis perangustis, tenuinervis, anguste triangularis, 12—16 mm longa, subacuta. *Bracteola* viridis vel purpurascens, marginibus membranaceis latis albis, apice viridi emarginato. *Flores* 1—3, 20—38 mm longi. *Tubus perigonii* 4—6 mm longus infundibularis; *segmenta* anguste obovata vel elliptica, 15—25 mm longa 5—9 mm lata, acuta vel subobtusa, vivide magenteo-rosea, in fauce atronervata, basi aurantiaca, segmenta exteriora a dorso atrovinosa vel purpurea, segmenta interiora a dorso rosea. *Stamina* erecta, prope basin perigonii inserta, circa dimidium perigonii attingentia; *filamenta* 4—5 mm longa, in dimidio inferiore pilosa, aurantiaca; *antherae* 4—7 mm longae flavae. *Stylus* 10—12 mm longus; *stigmata* ca. 2 mm

FIG. 52.
R. setifolia var. *ceresiana* (*de Vos* no. *1883, 1573*). 1, plant × ¾. 2, tunic teeth at base of corm. 3, outer perianth segment, lower surface. 4, inner perianth segments, lower and upper surfaces. 5, bract and bracteole. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf.



FIG. 53.

R. albomarginata (*de Vos* no. *2056*). 1, plant ×1. 2, outer perianth segments, upper and lower surfaces. 3, inner segment, lower surface. 4, bract and bracteole. 5, pistil, stamens, and perianth tube. 6, transverse section of leaf.

longa, plus minusve apices antherarum attingentia. *Capsulae* ellipsoideae, ca. 10 mm longae, in pedunculis curvatis patentissimis post anthesin, demum rectis.

Holotype: *de Vos 1999* in STE.

Plants 12—25 cm tall. *Corm* 7—10 mm diam., obliquely flattened near the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with rows of minute fibril clusters on the basal ridge, and apical fibres 5—10 mm long. *Stem* short or up to 50 mm long, usually not extending from the leaf bases. *Basal sheath* 1, up to 45 mm long. *Basal leaves* 2 or seemingly more in short-stemmed forms, filiform, 12—25 cm long, up to 1 mm diam., grooves narrow, leaf bases 2—3 mm wide; *cauline leaves* 1—2, shorter than the basal leaves. *Peduncles* 20—50 mm long, semiterete. *Bract* green or purplish, with very narrow membranous margins and slender veins, narrowly triangular, 12—16 mm long, subacute. *Bracteole* green or purplish, with wide, white, membranous margins, tip green, emarginate. *Flowers* 1—3, 20—38 mm long. *Perigone tube* 4—6 mm long, funnel-shaped; *segments* narrowly obovate or elliptical, 15—25 mm long, 5—9 mm wide, acute to subobtuse, bright magenta-pink (RHS 68A, B, 73A, 72C), with dark veins in the throat, cup orange-yellow; outer segments on the backs maroon or purplish, inner pink. *Stamens* erect, reaching about halfway up the perigone; *filaments* 4—5 mm long, pilose in the lower half, orange-yellow; *anthers* 4—7 mm long, pale yellow. *Style* 10—12 mm long; *stigmas* ca. 2 mm long, more or less at or below the anther tips. *Capsules* ellipsoid, ca. 10 mm long, on curved, widely patent peduncles after flowering, which straighten later. *Chromosome number* 2n = 30 (*de Vos 2056, 1956*).

CERES. Koue Bokkeveld: *Schlechter 8910* (BOL, GRA). 23 mls. N of Gydouw Pass: *de Vos 1956, 1999, 2056*. Waboomsrivier, Koue Bokkeveld: *Hanekom 618* (PRE).

This species apparently has a very local distribution in sandy loam on the plateau of the Koue Bokkeveld.

It is readily recognised by the small fibril groups on the basal ridge of the corm, bracteole with white membranous margins (whence the name), magenta-pink flowers with dark veins in the throat, filaments which are pilose in their lower half, and by peduncles and cauline leaves which are long in proportion to the generally short stem. The flowers resemble those of *R. fibrosa* and *R. saxatilis* to some extent. The species differs from the latter in its fibril clusters on the basal ridge and its shorter apical fibres on the corm, in the filaments which are pilose in their lower half, and in leaf structure—the epidermis is thick-walled and on the rib margin it is multiseriate. From *R. fibrosa*, to which it is allied, it differs in its smooth, hard, corm tunics, anthers not joined at their tips, generally shorter stem, and also in leaf structure.



FIG. 54.

R. longipes (*de Vos* no. *2201*). 1, plant $\times\frac{7}{8}$. 2, outer and inner perianth segments, upper surface. 3, outer segment, lower surface. 4, bract and bracteole $\times 1$. 5, pistil, stamens, and perianth tube. 6, ripening capsules $\times\frac{3}{4}$. 7, transverse section of leaf.

37. **Romulea longipes** Schltr. J. Bot. 36: 377 (1898); Béguinot 1907b p. 477 et 1909 p. 77; Martin & Noel 1960 p. 30; Batten & Bokelmann 1966 p. 32.

Icones: Batten & Bokelmann 1966 Pl. 26, 3; this work Fig. 54.

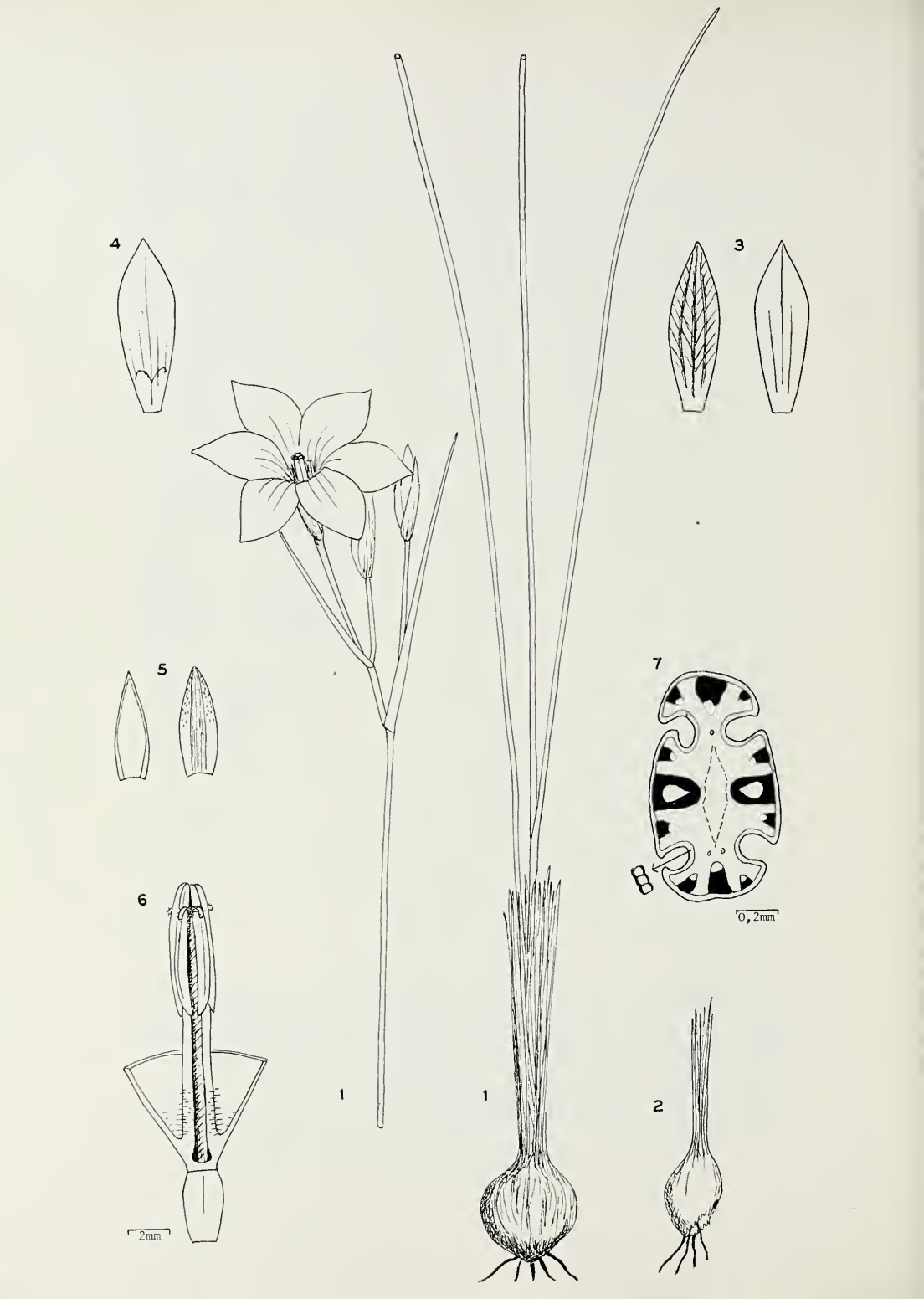
Plants 15—50 cm tall. *Corm* 6—15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with rows of minute fibril clusters on the basal ridge, and apical fibres 3—5 mm long. *Stem* 4—35 cm long, rarely shorter, erect, rigid, extending above-ground, with the topmost internode 10—40 mm or sometimes up to 90 mm long and somewhat patent. *Basal sheaths* mostly 2, 10—60 mm long. *Basal leaves* mostly 2, filiform, 15—50 cm long, with the first leaf longer than the second, up to 1 mm diam., suberect or bent, with the four ribs subequal in width, glabrous or ciliate with sparse white hairs along the margins of the median ribs, grooves usually narrow, sheathing leaf bases 2—4 mm wide; *cauline leaves* 1—3, 25—80 mm long, with the unifacial blade short or absent. *Peduncles* 15—35 mm long, semiterete, glabrous or ciliate on the sharp angles, erect or somewhat flexuose and patent. *Bract* green or reddish or sometimes semitranslucent near the base, usually with very narrow membranous margins, narrowly triangular or narrowly ovate, somewhat concave, 12—20 mm long, obtuse to acuminate. *Bracteole* green in upper half, submembranous below, with wide membranous margins which are often brown-edged or brown-streaked towards the top, tip green. *Flowers* mostly 2—4, 22—38 mm long. *Perigone tube* 3—5 mm long, funnel-shaped, pilose in the base opposite the stamens; *segments* narrowly elliptical or the inner sometimes narrowly obovate, 15—30 mm long, 6—8 mm wide, acuminate or acute, pale yellow, yellow-green, cream, or pale apricot (RHS 11B–D, 29B–D), often with salmon-pink veins, cup yellow with V-shaped marks; outer segments on the backs yellowish-green or with greenish-brown veins and fine feathered veining. *Stamens* erect, reaching less than halfway up the perigone; *filaments* 3—8 mm long, pilose near the base, orange-yellow; anthers 5—7 mm long, at first joined at their tips, yellow or rarely violet. *Style* 8—14 mm long; *stigmas* ca. 1 mm long, reaching the anther tips. *Capsules* ellipsoid, ca. 10 mm long, on straight or somewhat patent peduncles. *Chromosome number* 2n = ca. 30 (*de Vos 2201*).

Holotype: *Galpin 3023* in B. Isotype in PRE. A topotype, *Galpin* ann. 1895 in GRA.

PORT ELIZABETH. North End cemetery: *Long Fl. E. Cape 186* (BOL, GRA, PRE, K). Mount Road: *Long 187* (GRA, K). Parson's Vlei: *Long 829* (GRA, PRE, K). Bethelsdorp: *Paterson 696* (GRA). Bethelsdorp salt pan: *Fries, Norlindh & Weimarck 1203* (NBG, PRE, S). Walmer: *Jorden 8* (GRA). Thornhill: *Cruden 437* (GRA, PRE). Loerie Plantation: *Dix 89* (GRA). Van Stadens: *Urton 318* (GRA). Near Port Elizabeth: *Fries, Norlindh & Weimarck 460* (PRE, S), *Bokelmann 4Pl 16* (NBG). 20 mls. W of Port Elizabeth: *de Vos 2201*.

ALEXANDRIA. De Bega Heights: *Archibald 4517* (RUH).

ALBANY. *Zeyher SAM 20726*. Grahamstown: *MacOwan 316* (BOL). Highlands road, ca. 5 mls. from Grahamstown: *Guillarmod 6692* (GRA).


4
3
5
7
6
1
1
2
2mm
0,2mm

BATHURST. Port Alfred: *Galpin 3023*, *Galpin* ann. 1895, *Compton 21077* (NBG). 3 mls. NNW of Southwell: *Acocks 12060* (PRE). Mouth of Visrivier: *MacOwan* s.n. (BOL).

EAST LONDON. *Bokelmann 1002* (NBG). Near Shelley Beach: *Galpin 2794* (PRE, K). Near sea: *Rattray 208* (GRA).

WITHOUT LOCALITY. *Irid. 206* (G). *Verreaux* ann. 1831 (G). *Colbet*, de Verreaux, sub *Trichonema speciosum* Ker (P). Ex hb. Boivin, sub *T. speciosum* (P). *Burchell 3909* (K)—at head of Kasonga River, fide McKay 1943. *Zeyher 1605* partly (K).

Zeyher s.n. (K) and *Ecklon & Zeyher* s.n. sub *T. fragrans* Jacq. (PRE) are this species, but the locality label 76, i.e. Clanwilliam, is erroneous.

Flowering period July to November.

In sandy soil at low altitude.

This Eastern Province species occurs mostly in the coastal districts from East London to about 25 miles west of Port Elizabeth, where it almost comes into contact with *R. dichotoma* to which it is closely allied. It differs from the latter species in the possession of two basal leaves with their leaf ribs almost equal in width, each rib possessing one large and two small vascular bundles, in flower colour, and in the stem which does not show such a marked dichotomous branching near its top.

R. longipes is also closely allied to the high altitude species *R. fibrosa*, from which it differs in its corm which has smooth, hard tunics, its flower colouring, and in its more herbaceous bract and bracteole.

Schlechter (1898) recorded small apical glands on the anther tips, but they are not evident. He probably saw the broken off ends of the connectives, which were connate at their tips in the young flower.

38. **Romulea fibrosa** De Vos nom. nov.

R. alpina L. Bolus S. Afr. Gard. & Country Life 18: 342 (1928)—syntypes: *Keet 1052* (BOL, GRA), *Fourcade 2831* (BOL): non Rendle 1895.

Icones: S. Afr. Gard. & Country Life 18: 341 (1928); this work Fig. 55.

Plants 12—45 cm tall, sometimes to 60 cm. *Corm* 10—20 mm diam., usually covered with the fibrous relics of old leaf bases, apical fibres pressed against the stem for 20—80 mm; young corm obliquely flattened at the base with a crescent-shaped basal ridge, with tunics hard, smooth, brown where still unbroken, and with rows of minute fibril clusters on the basal ridge. *Stem* 8—32 cm long, erect, slender, 1 mm or less in diam., extending above-ground. *Basal sheaths* 1—2, up to 90 mm long, often hidden by the fibres of the corm. *Basal leaves* usually 2, sometimes more or only 1, filiform, 12—45 cm or up to 60 cm long, the second leaf often shorter, 1 mm or less in diam., with four ribs subequal in width, sometimes minutely ciliate on the margins of the ribs, grooves narrow, sheathing leaf bases 1—2 mm wide; *cauline leaves* 1—3, 20—120 mm long, sheathing leaf bases 2—3 mm wide. *Peduncles* 10—35 mm long, semiterete, glabrous, suberect, slender. *Bract* more or less membranous or greenish in the centre with narrow or wider membranous margins which are rusty-red in the upper half or sometimes almost colourless, almost narrowly triangular, 10—

FIG. 55.

R. fibrosa (*de Vos* no. *2078*). 1, plant ×1. 2, young corm with basal ridge. 3, outer and inner perianth segments, lower surface. 4, inner segment, upper surface. 5, bract and bracteole ×1. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf.

25 mm long, obtuse to acute or emarginate. *Bracteole* somewhat membranous with wide, mostly rusty-red or sometimes colourless membranous margins. *Flowers* 1—3, 25—35 mm long. *Perigone tube* 4—7 mm long, funnel-shaped; *segments* narrowly obovate, 16—25 mm long, 7—10 mm wide, acute, subobtuse or almost acuminate, magenta to pale pink, with a diffuse violet-blue blotch on each segment in the throat, cup often yellow with small orange markings; outer segments on the backs, reddish-purple or with 3 violet veins and fine feathered veining towards the margins. *Stamens* erect or slightly incurved at the tips, reaching about halfway up the perigone; *filaments* 5—8 mm long, very slightly pilose in the lower half or glabrous, orange-yellow or greenish-yellow; *anthers* 4—6 mm long, at first joined at the tips, pale yellow or violet or with violet lines. *Style* 10—12 mm long; *stigmas* ca. 1 mm long, reaching below or almost to the anther tips. *Capsules* ellipsoid, ca. 8 mm long, on suberect peduncles. *Chromosome number* 2n = ca. 30 (*de Vos 1906*).

Lectotype: *Fourcade 2831* in BOL. Isotype in K.

LADISMITH. Mountains E side of Seven Weeks Poort: *Wurts 1575* (NBG). ?Ridge W of Rooiberg Pass: *Wurts 1645* (NBG).

PRINCE ALBERT—OUDTSHOORN. Swartberg Pass: *Stokoe SAM 55759*. Near summit of Swartberg Pass: Stokoe *SAM 63689*. Swartberge: Stokoe *SAM 60105*, *de Vos 1906*.

GEORGE. ?Near Power Station: *Gillett 2100* (BOL). Montagu Pass: *Hutchinson 1220* (PRE, K), *Martin 103* (NBG). Tolberg: *Taylor 4468* (PRE).

KNYSNA. On crest of Hoogeberg: *Keet 1052* (BOL, GRA).

UNIONDALE. Bloubosberg, E ridge: *Fourcade 2831*. Joubertina, N slopes of Tsitsikamma Mts.: *Esterhuysen 10632* (BOL). ?Die Hoek, near Joubertina: *Esterhuysen 16406* (BOL). Hoopsberg, lower S and N slopes: *Esterhuysen 6523* (BOL, PRE). Top of Prince Alfred's Pass: *de Vos 2078*.

HUMANSDORP. Top of Kareedouw Pass: *Hutchinson 1435* (PRE, K). Witelsbos Peak: *Esterhuysen 6787* (BOL).

UITENHAGE. Cockscomb, Great Winterhoek Mts.: *Esterhuysen 28008* (BOL, PRE).

Flowering period October to December.

R. fibrosa is a high altitude species occurring on mountain ranges running parallel to the southern coast of Cape Province. It differs from other species of *Romulea* in the corms of older plants being covered with thick layers of the fibrous relics of old leaf bases. Every year the new corm is formed within the old fibrous coverings. The strong fibro-vascular bundles of old leaf bases are persistent around the base of the flowering stem, covering it for several centimetres with a mass of fibres.

The species is closely allied to *R. longipes* and it is difficult to distinguish young plants in which the corms are still without fibrous coverings, and older plants which have lost their fibrous tunics by careless handling. As the two species have basically the same type of corm, they can then be distinguished only by the flower colour and the more membranous bract and bracteole of *R. fibrosa*. Three collections, viz. *Gillett 2100* and *Esterhuysen 16406* in BOL and *Wurts 1645* in NBG, all without corms, have tentatively been included with this species.

R. fibrosa differs from *R. dichotoma* in its two basal leaves, with the four leaf ribs almost equal in width and each possessing three superficial vascular bundles, and in flower colour and markings on the perianth.

It was necessary to rename the species, as its former epithet is a later homonym of *R. alpina* Rendle.

39. **Romulea jugicola** De Vos sp. nov.

Fig. 56, 63.

Cormus 6—15 mm diam., basi oblique complanatus crista lunata, tunicis rigidis laevibus brunneis, fibrillis minute fascicularibus in crista basilari, apice fibris 10—15 mm longis praedito. *Caulis* 40—120 mm longus erectus, saepe supra vaginas foliorum exsertus, angulatus, saepe sparsim ciliatus. *Vaginae basilares* 2. *Folium basilare* 1, filiforme, ca. 30 cm longum, 1 mm ad fere 2 mm diam., pilis longis albis in marginibus porcarum mediarum, sulcis aliquanto dilatatis; *folia caulina* 2—3, breviora, pilosa, parte unifaciali foliorum superiorum reducta. *Pedunculi* 15—30 mm longi semiteretes, in angulis pilosi, aliquanto patentes. *Bractea* viridis, marginibus membranaceis angustis, anguste ovata, aliquanto concava 15—20 mm longa dense nervata. *Bracteola* viridis marginibus membranaceis latis brunneo-punctatis vel brunneo-striatis, decrescentibus versus apicem parvum scariosum. *Flores* 3—4 vel plures, 25—40 mm longi. *Tubus perigonii* 4—6 mm longus infundibularis; *segmenta* obovato-elliptica vel elliptica 18—30 mm longa 8—12 mm lata acuta vel obtusa, aurantiaca, segmenta exteriora a dorso rubiginosa vel viridibrunnea. *Stamina* erecta non dimidium perigonii attingentia; *filamenta* 6—7 mm longa basi vel ad apices pilosa, aurantiaca; *antherae* 4—6 mm longae flavidae primo apicibus conjunctae. *Stylus* 10—13 mm longus; *stigmata* apices antherarum attingentia. *Capsulae* late ellipsoideae aliquanto trilobae 10—15 mm longae, in pedunculis parum patentibus.

Holotype: *Acocks 20592* in PRE. Isotypes in K and M.

Plants ca. 30 cm tall. *Corm* 6—15 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with rows of minute fibril clusters on the basal ridge, and apical fibres 10—15 mm long. *Stem* 40—120 mm long, erect, often extending from sheathing leaf bases, angled, often sparsely ciliate on angles. *Basal sheaths* 2, up to 40 mm long. *Basal leaf* 1, filiform, ca. 30 cm long, 1 mm to almost 2 mm diam., with four ribs subequal in width, with long white hairs on margins of median ribs, grooves somewhat widened; *cauline leaves* 2—3, shorter, hairy, upper ones with the unifacial part reduced, leaf sheaths to 6 mm wide. *Peduncles* 15—30 mm long, semiterete, hairy on sharp angles, somewhat patent. *Bract* green with narrow membranous margins, narrowly ovate, somewhat concave, 15—20 mm long,

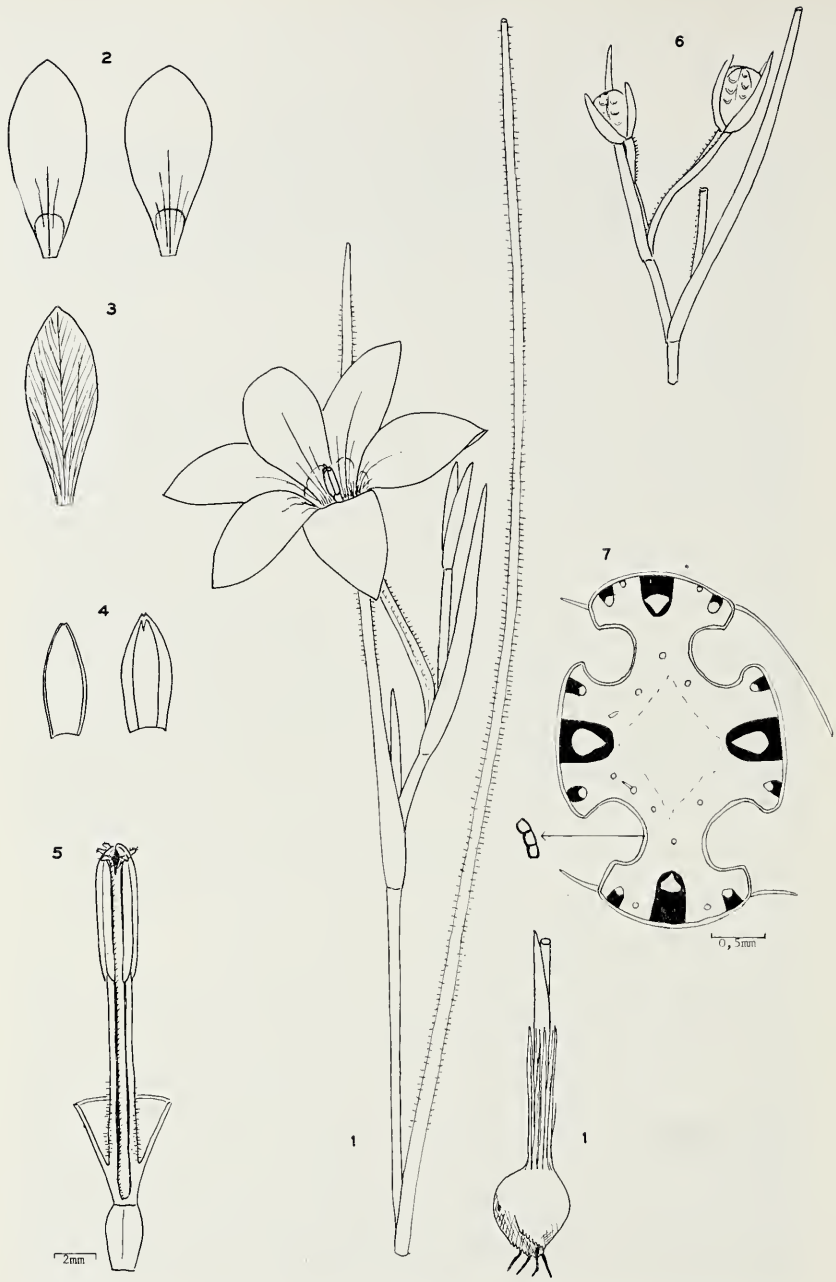


FIG. 56.

R. jugicola (*de Vos* no. *2212*). 1, plant ×1. 2, outer and inner perianth segments, upper surface. 3, outer perianth segment, lower surface. 4, bract and bracteole. 5, pistil, stamens, and perianth tube. 6 ripening capsules. 7, transverse section of leaf.

with closely spaced veins. *Bracteole* green with wide brown-speckled or brown-streaked membranous margins narrowing to a small scarious tip. *Flowers* 2—4 or more, 25—40 mm long. *Perigone tube* 4—6 mm long, funnel-shaped; *segments* obovate-elliptical or elliptical, 18—30 mm long, 8—12 mm wide, acute or obtuse, orange-yellow (RHS 24B, C), outer segments on the backs reddish-brown or greenish-brown. *Stamens* erect, not reaching halfway up the perigone; *filaments* 6—7 mm long, pilose at the bases or up to the tips, orange-yellow; *anthers* 4—6 mm long, at first joined at the tips. *Style* 10—13 mm long; *stigmas* reaching to the anther tips. *Capsules* ellipsoid, somewhat 3-lobed, 10—15 mm long, on slightly patent peduncles. *Chromosome number* 2n = ca. 30, 32 (*de Vos 2212*).

GEORGE. 19 mls. SE of Dysselsdorp: *Acocks 20592*. 2 mls. NW of Daskop towards Dysselsdorp: *de Vos 2212*.

Flowering period August.

This new species apparently has a very local distribution in rhenosterbush veld on a stony foothill of the Kammanassie mountains in the Klein Karoo between Uniondale and Oudtshoorn. It is allied to *R. dichotoma*, *R. longipes*, and *R. fibrosa*, resembling the first in its single basal leaf, and the last named two species in its leaf ribs subequal in width. It differs from all three species in its orange-coloured flowers, greater degree of hairiness, and in its wider stomatiferous grooves. The basal internode of the first axillary branch is not elongated as in *R. dichotoma*, and it does not show the forked branching of the latter species. The corm is not covered with fibrous tunics as in *R. fibrosa*. It seems to merit specific status.

40. **Romulea dichotoma** (Thunb.) Baker, J. Linn. Soc. 16: 89 (1877); Klatt 1882 p. 401 et 1895 p. 164 excl. syn. *R. fragrans* Eckl.; Béguinot 1907b p. 110 et 1909 p. 91 excl. syn. *R. fragrans* Eckl.; N. E. Brown 1928 p. 21; de Vos 1965 p. 138.

Gladiolus dichotomus Thunberg 1784 p. 10 et 1811 p. 187 et 1823 p. 45; Sprengel 1825 p. 152; Baker 1896 p. 163 pro syn.; Juel 1918 p. 103 excl syn.

Trichonema dichotomum Klatt 1865—66 p. 666 excl. syn. *T. fragrans* Eckl.—type: *Ecklon & Zeyher* s.n. (C).

Romulea rosea Eckl. var. *dichotoma* Baker 1892 p. 104 (excl. syn. *R. flexuosa* Klatt et *R. tubata* Klatt) et 1896 p. 42 excl. all syns. except *T. dichotomum* Klatt. *R. caplandica* Béguinot 1907a p. 332 et 1907b p. 115 et 1909 p. 112—ty. e: *Rust 556B* (B).

Bulbocodium dichotomum (Bkr.) Kuntze 1891 p. 700.

R. speciosa (Ker) Baker 1877 p. 89 is perhaps partly synonymous. But see under Excluded Species.

Fig. 57, 61.

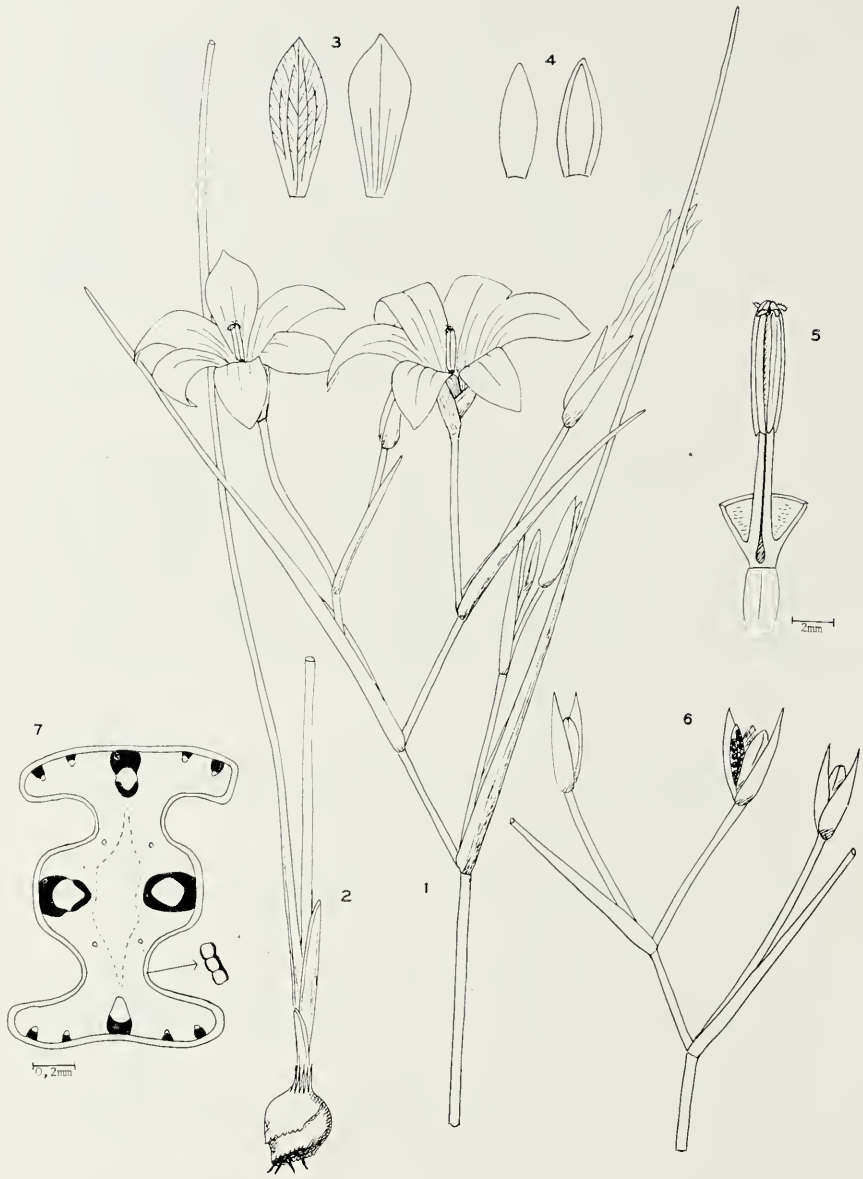


FIG. 57.

R. dichotoma (*de Vos* no. *2063*). 1, 2, plant ×1. 3, outer and inner perianth segments, lower surfaces. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, ripe and ripening capsules ×1. 7, transverse section of leaf.

Plants 15—45 cm tall. *Corm* 6—15 mm diam., obliquely flattened near the base, with a crescent-shaped basal ridge; tunics hard, smooth, brown, with rows of minute fibril clusters on the basal ridge, and apical fibres 3—5 mm long. *Stem* 4—35 cm long or sometimes shorter, erect, rigid, 0,8—1,5 mm diam., extending above-ground, usually dichotomously branched near the top, with the upper internodes 5—50 mm long, patent especially in fruiting specimens. *Basal sheaths* mostly 2, 10—50 mm long. *Basal leaf* mostly 1 or rarely 2 in some young plants, but the first leaf then shorter than the second, filiform or somewhat 4-angled, 15—45 cm long, ca. 1—2 mm diam., suberect or sometimes bent, 4-ribbed with the two lateral ribs much narrower than the two median, grooves narrow or wide, sheathing leaf bases 2—5 mm wide; *cauline leaves* 1—2, mostly 25—60 mm or sometimes to 220 mm long, with the unifacial blade short or reduced, sheathing leaf bases up to 6 mm wide. *Peduncles* 15—60 mm long, semiterete, glabrous or ciliate on the sharp angles, straight, patent. *Bract* green, often with very narrow membranous margins, almost narrowly triangular, somewhat concave 12—20 mm long, acute, emarginate or obtuse. *Bracteole* often slightly shorter or longer than the bract, green with wide membranous margins which are reddish-brown upwards and white in the lower half, tip almost green. *Flowers* 1—4 or more, 20—40 mm long. *Perigone tube* 3—5 mm long, funnel-shaped, minutely pilose in the base opposite the stamens; *segments* narrowly elliptical or narrowly obovate, 16—32 mm long, 6—10 mm wide, subobtuse to acute, amaranth pink (RHS 63C, 68A-C), rarely salmon-pink, cup greenish-yellow or golden-yellow with V-shaped marks, throat with 1—3 deep pink or purple veins, on the backs mostly with 3—5 reddish-brown veins and fine feathered veining, inner segments often slightly wider and shorter than the outer and then narrowly obovate. *Stamens* erect, generally reaching less than halfway up the perigone; *filaments* 4—8 mm long, minutely pilose in the lower half, golden-yellow; *anthers* 4—7 mm long, at first joined at the tips, yellow with dark longitudinal lines. *Style* 10—15 mm long; *stigmas* ca. 1 mm long, reaching the anther tips or just below them. *Capsules* shortly cylindrical, ca. 10 mm long, on rigid, straight, patent peduncles. *Chromosome number* 2n = 30 (*Duthie 1243*).

Holotype: *Thunberg* sub *Gladiolus dichotomus* in Hb. Thunberg in UPS. Baker's erroneous identification of this plant as *G. permeabilis* De la R. was put right by N. E. Brown (1928).

CALEDON, HERMANUS. Hottentotsholland: *Wall 3* (S). Near Stanford: *de Vos 2137*. Near Witvoetskloof: *de Vos 2134*.

SWELLENDAM. Bontebok Park: *Marais 77A* (STE).

RIVERSDALE. *Rust 566B* (B). Droogevlakte: *Muir 1595* (BOL, GRA, NU, Z). From the Downs: *Ferguson* s.n. (BOL). 4,2 mls. W of Albertinia turning: *Acocks 22688* (PRE).

MOSSELBAY. *Marloth 7492b* (PRE). *Lindeberg* Aug. 1936 (S).

GEORGE. *Burchell 6057* (K). Outeniqua Mts.: *Rehmann 62* (Z).

KNYSNA. *Burchell 5612, 5630, 5644* (K). *Tyson 3068* (K). Between Knysna and George: *Rodin 1322* (BOL, PRE, K, UC). Between Knysna and Keurbooms: *L. Bolus* ann. 1928 (BOL). Belvidere: *Duthie 1243* (STE). Some miles E of Knysna: *de Vos 2063, 2072*. Noetzie: *Acocks 21513* (PRE). The Crags: *Wurts 2027* (NBG). Near Sedgefield: *Cassidy 224* (NBG). Plettenberg Bay: *Rogers 26714* (Z). Near Plettenberg Bay: *Barker 10631*.

HUMANSDORP. *Thode 1033* (PRE). *Loubser 877* (NBG). Assegaaibos: *Rogers 3035* (GRA, NU, SRGH, Z). Kleinbos River: *Fourcade 363* (GRA). Witelsbos: *Fourcade 897* (GRA). Road to Robhoek: *Fourcade 1448* (GRA). 10 mls. from Humansdorp on Stormsrivier road: *Story 2841* (PRE). Kruisfontein: *Galpin 4655* (PRE, partly GRA). 18 mls. E of Stormsrivier bridge: *de Vos 2067, 2068*. Sandhills E of Kromrivier mouth: *Fourcade 5612* (NBG).

WITHOUT LOCALITY. *Thunberg* (Hb Thunberg) sub *Gladiolus dichotomus. Sparrmann* ann. 1772 (S).

Drège 8449 in K is this species, but the locality, Bergevallei S of Olifantsrivier is probably erroneous and refers to *Drège 8449* in P and G, which is *R. schlechteri. Ecklon & Zeyher* s.n. in C, Klatt's type of *Trichonema dichotomum*, also has a probably erroneous locality label of Olifantsrivier and Villa Brakfontein.

Flowering period September—October.

This species is readily recognisable by its corm, its elongated stem which, especially in fruiting specimens, appears to be dichotomously branched near the top, its mostly pink flowers with fine feathered veining on the backs of the perianth segments and generally a single basal foliage leaf which has the two lateral ribs reduced in width. Each lateral rib has a single vein with a small amount of chlorenchyma on each side of it, and the rib margins are rounded (Fig. 57.7). The median ribs have the normal structure with one large and two or four small veins and, being wider, they often fold over the lateral ribs to some extent. Rarely there are two basal foliage leaves in young plants, with the lowermost leaf then shorter than the second. In older plants the lowermost leaf has lost its terete unifacial blade, and has become a basal sheath.

The hairiness on the plants varies: in *Marais 77A* (STE) even the bracts are hairy.

R. dichotoma is closely allied to *R. longipes*, and the two species have been confused in many herbaria. *R. dichotoma* differs from the latter in its mostly single basal leaf, with the lateral ribs reduced in width, mostly pink flowers, and forked branching which is brought about by an elongation of the basal internode of the lateral branches, especially the lowermost. This, and the top internode of the main stem, bend at their bases and diverge at an angle of about 90°.

The two species have an almost continuous range of distribution with, as far as the present data show, a gap of about 20 miles separating them on the border of the Humansdorp and Port Elizabeth district. Unfortunately no hybridisation experiments were carried out, as living material of *R. longipes* was obtained only in 1969.

R. caplandica is a larger *R. dichotoma* and cannot be separated from the latter, even as a variety, on account of the many intermediates found.

3.2 Subsection AMOENAE De Vos subsect. nov.

Cormus campanulatus basi planus crista basilari circulari, vel basi oblique complanatus crista basilari fere circulari praeditus, tunicis basi in fasciculis minutis fibrillarum fissis. *Flores* magni, plerumque coccinei. *Stamina* in dimidio tubi perigonialis inserta; *filamenta* basi dilatata, antheris breviora.

Type species: *R. amoena* Beg.

Corm symmetrical and bell-shaped with a circular basal ridge, or obliquely flattened at the base with a basal ridge forming an almost complete circle; tunics split into minute fibril clusters on the basal ridge. *Stem* usually short, sometimes slightly elongated. *Leaves* terete. *Bract* green or sometimes reddish, with closely spaced veins. *Bracteole* with wide membranous margins narrowing to a green tip. *Flowers* large, carmine-red to deep rose, often with purplish-black blotches in the throat, cup concolorous red, or cream with slender dark lines. *Stamens* inserted halfway up the perigone tube; *filaments* widened at the bases, shorter than the anthers.

Leaf anatomy. Margins of the leaf glabrous, with a thick-walled, sometimes multiseriate epidermis, without subepidermal fibres. Epidermal cells in the grooves without papillae.

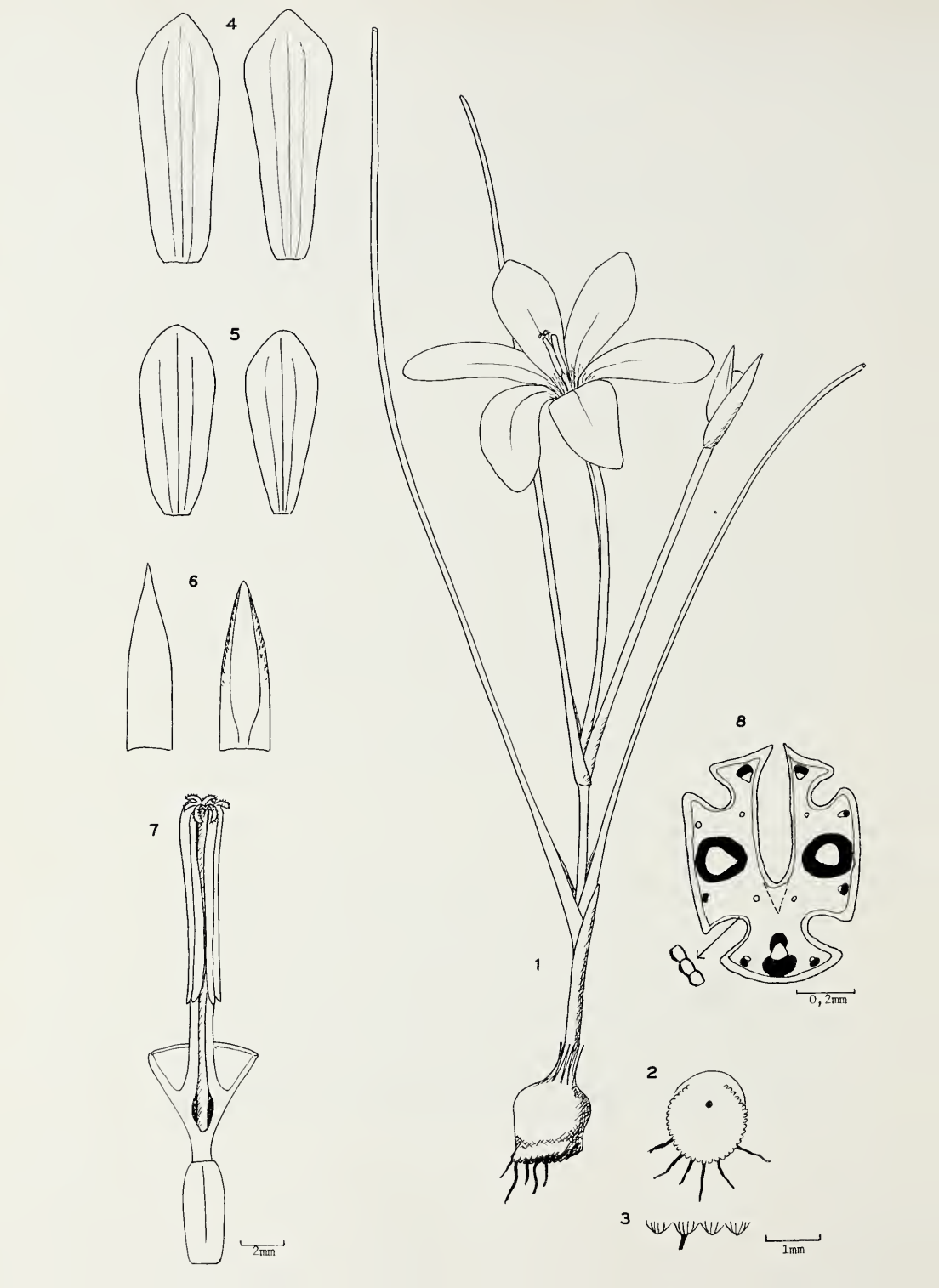
This subsection differs from subsection *Aggregatae* in chromosome number, but has been included with the latter in one section, mainly because of the peculiar splitting of the corm tunics at the bases of the corms. *R. sanguinalis* of subsection Amoenae forms a morphological link between the subsections. This species is less specialised than *R. amoena*.

Béguinot placed *R. amoena* with his stirps *Hirsutae*. Although its corm has the same shape as in *R. hirsuta*, it differs from this in several important features (see below).

41. **Romulea sanguinalis** De Vos sp. nov.

Fig. 58.

Cormus ca. 10 mm diam., basi oblique complanatus crista parva fere circulari praeditus, tunicis rigidis laevibus brunneis, in fasciculis minutis fibrillarum in crista basilari fissis, apice fibris 3—5 mm longis praedito. *Caulis* 40—80 mm longus supra vaginas foliorum breviter exsertus. *Vagina basilaris* 1. *Folia basilaria* 2, filiformia 20—35 cm longa ca. 0,7 mm diam., suberecta, sulcis angustis, basibus vaginantibus 3 mm latis; *folium caulinum* 1, foliis basilaribus brevius. *Pedunculi* 40—50 mm longi semiteretes rubiginosi. *Bractea* viridis, marginibus membranaceis perangustis aegre manifestis, plus minusve anguste triangularis 18—28 mm longa acuta, nervis approximatis. *Bracteola* aliquando angustior quam bractea, viridis praesertim in dimidio superiore, marginibus membranaceis latis brunneo-punctatis vel incoloratis,


4
5
6
7
8
1
2
3
2mm
0,2mm
1mm

apice viridi. *Flores* 1—2, 30—45 mm longi. *Tubus perigonii* 5—6 mm longus infundibularis; *segmenta* subaequalia vel interiora parum breviora et latiora quam exteriora, 22—35 mm longa 8—12 mm lata obtusa vel subacuta coccinea, segmenta exteriora a dorso plerumque flavo-vittata, fere anguste elliptica, segmenta interiora anguste obovato-cuneata. *Stamina* erecta, in dimidio tubi perigonii inserta; *filamenta* ca. 5 mm longa basi dilatata, glabra rubella; *antherae* 8—10 mm longae luteae. *Stylus* 15—18 mm longus; *stigmata* 2—3 mm longa, apices antherarum attingentia vel paulo superantia.

Holotype: *Burger STE 30207* in STE.

Plants 20—35 cm tall. *Corm* ca. 10 mm diam., obliquely flattened towards the base with a small basal ridge forming an almost complete circle; tunics hard, smooth, brown, split into minute fibril clusters on the basal ridge and apical fibres 3—5 mm long. *Stem* 40—80 mm long, shortly extending from the sheathing leaf bases. *Basal sheath* 1, 30—60 mm long. *Basal leaves* 2, filiform, 20—35 cm long, ca. 0,7 mm diam., suberect, grooves narrow, sheathing leaf bases 3 mm wide; *cauline leaf* 1, shorter than the basal leaves. *Peduncles* 40—50 mm long, semiterete, reddish-brown. *Bract* green with very narrow, hardly visible membranous margins, more or less narrowly triangular, 18—28 mm long, acute, with closely spaced veins. *Bracteole* sometimes shorter than the bract, green especially in upper half, with wide brown-speckled or colourless membranous margins, tip green. *Flowers* 1—2, 30—45 mm long. *Perigone tube* 5—6 mm long, funnel-shaped; *segments* subequal or the inner slightly shorter and wider, 22—35 mm long, 8—12 mm wide, obtuse to subacute, carmine-red outer segments mostly red and yellow streaked on the backs and almost narrowly elliptical, inner segments narrowly obovate-cuneate. *Stamens* erect, inserted halfway down the perigone tube; *filaments* ca. 5 mm long, widened at the bases, glabrous, reddish; *anthers* 8—10 mm long, golden-yellow. *Style* 15—18 mm long; *stigmas* 2—3 mm long, reaching the anther tips or slightly higher. *Capsule* not seen. *Chromosome number* 2n = 24 (*STE 30207*).

CALVINIA. Menzieskraal 24 mls. from Nieuwoudtville: *Burger STE 30207*.

Flowering period August.

This new species which has been collected only once, is readily recognised by its carmine perianth without any markings inside, and its short glabrous filaments with widened bases. It is further characterised by a shortly extended stem, green bract, and corm with a basal ridge forming an almost complete circle. The best specimens show minute fibrils aggregated into small clusters on the basal ridge of the corm.

It shows some affinity with the subsection Aggregatae in its corm and tunic structure and in leaf anatomy, but it differs in the colouring of the perianth, its short glabrous filaments with wider bases, and in its chromosome number.

FIG. 58.

R. sanguinalis (*STE 30207*). 1, plant ×1. 2, base of corm. 3, tunical teeth at base of corm. 4, 5, outer and inner perianth segments of two plants. 6, bract and bracteole ×1. 7, pistil, stamens, and perianth tube. 8, transverse section of leaf.

Although the basal ridge of the corm does not form a complete circle as in *R. amoena*, the two species, *R. amoena* and *R. sanguinalis*, have so many features in common, that they are probably closely allied. Their flower colouring, nature of the bract and bracteole, long anthers, filaments widened at the bases, minute fibril clusters on the basal ridge of the corm, and their chromosome numbers are similar.

42. **Romulea amoena** Schltr. ex Béguinot, Bot. Jb. 38: 334 (1907a) et 1907b p. 109 et p. 474 et 1909 p. 90.

Icones: S. Afr. Gard. & Country Life 18: 341 (1928); this work Fig. 59.

Plants 8—30 cm tall. *Corm* bell-shaped, 6—10 mm diam., with a flat or concave basal disc and a circular basal ridge; tunics hard, smooth, brown, with small clusters of minute fibrils on the basal ridge, and apical fibrils 5—10 mm long. *Stem* very short, hidden by the leaf bases or sometimes up to 100 mm long and shortly extending. *Basal sheath* usually 1, 15—40 mm long. *Leaves* usually 3—4, basal or sometimes 2 basal and 1—2 cauline, filiform, suberect or bent, 7—30 cm long, ca. 1 mm diam., grooves narrow, sheathing leaf bases 4—6 mm wide. *Peduncles* 20—50 mm long, rarely longer, semiterete. *Bract* green or sometimes reddish, sometimes with very narrow membranous margins, more or less narrowly triangular, 17—30 mm long, acute, rarely obtuse, with closely spaced veins, often reaching more than halfway up the perigone. *Bracteole* sometimes shorter than the bract, with wide, brown-streaked or almost colourless membranous margins narrowing upwards to a green tip, subobtuse to subacute or emarginate. *Flowers* 1—2, 25—45 mm long. *Perigone tube* 5—7 mm long, funnel-shaped; *segments* subequal or the inner slightly shorter and wider, narrowly obovate, 18—35 mm long, 9—15 mm wide, acute to subobtuse, sometimes minutely emarginate, carmine-red to deep rosy pink (RHS 47A, B, C, D), with large purplish-black blotches in the throat, cup cream with slender dark lines and dark V-shaped marks towards the base; outer segments on the backs irregularly marked with red and yellow or sometimes purplish-red with a light median line. *Stamens* erect, inserted halfway down the perigone tube; *filaments* 3—5 mm long, widened and pilose at the bases, cream; *anthers* 8—10 mm long, pollen golden-yellow. *Style* 10—15 mm long; *stigmas* 2—3 mm long, reaching halfway up the anthers or nearly to their tips. *Chromosome number* 2n = 24 (*STE 30198*).

Holotype: *Schlechter 10896* in G. Isotypes in BOL, GRA, PRE, B, BM, K, S, Z.

CALVINIA. Onder-Bokkeveld, Papelfontein: *Schlechter 10896*. Near Nieuwoudtville: *Burger STE 30198*. 15 mls. from Nieuwoudtville on Oorlogskloof road: *Lewis SAM 60232* (SAM, STE, K). Oorlogskloof: *Hanekom 3119* (PRE).

3119 = Grid Ref.

1443

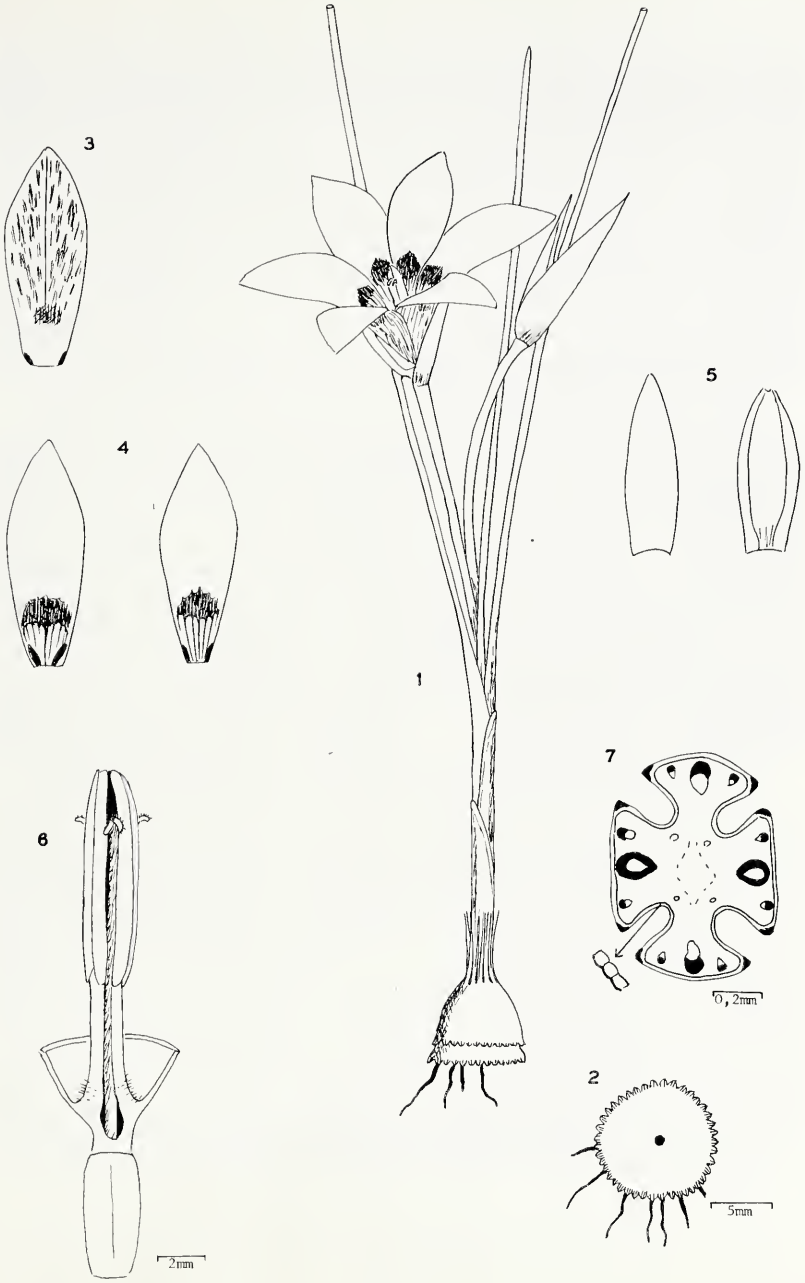


FIG. 59.

R. amoena (*de Vos* no. *1601*). 1, plant about three years old ×1. 2, base of corm. 3, outer perianth segment, lower surface. 4, outer and inner segments, upper surface. 5, bract and bracteole ×1. 6, pistil, stamens and perianth tube. 7, transverse section of leaf.

Flowering period August.

This rare species, found in red stony ground on the plateau in the neighbourhood of Nieuwoudtville, shows very constant features. It differs from the Hirsutae in which Béguinot placed it, in the markings on the perianth, in the anthers which are twice as long as the filaments, in the more robust and usually larger bracts and bracteoles, in leaf anatomy, and in the small clusters of minute fibrils on the basal ridge of the corm (the latter to be seen with the aid of a hand lens).

Béguinot described the stigmas as higher than the anther tips and the corm as ovate. These features were not observed now.

R. amoena is sympatric with *R. sabulosa*, *R. monadelpha*, and *R. sanguinalis*. It is readily distinguished from these species by its bell-shaped corm and the characteristic markings on the perianth, and it differs from *R. monadelpha* also in its free filaments.

4 Section Pratenses De Vos sect. nov.

Cormus basi crista lunata praeditus, tunicis in serie fibrillarum fascicularum in crista basilari fissis. *Caulis* brevis, obtectus. *Folia* plura basilaria filiformia vel compresso-cylindrica. *Flores* parvi pallide rosei vel pallide lilacino-rosei vel fere albi. *Tubus perigonii* brevis. *Stamina* erecta, prope basin tubi perigonialis inserta, paulo exserta.

Type species: *R. pratensis* De Vos.

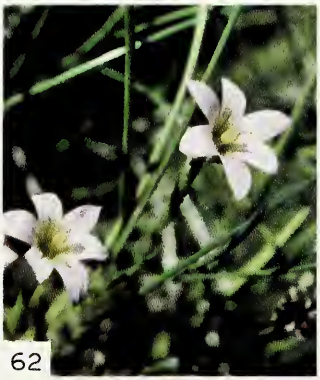
Corm oblique at the base with a small crescent-shaped basal ridge; tunics split on the ridge into a row of slender fibril clusters. *Stem* short, hidden by the leaf sheaths. *Leaves* several, basal, filiform to compressed cylindrical. *Peduncles* bending and elongating slightly in early fruiting stage. *Bract* green, sometimes submembranous in the lower half. *Bracteole* with wide membranous margins. *Flowers* up to 24 mm long, usually pale rose, pale lilac-rose to almost white, cup greenish-yellow. *Perigone tube* short, funnel-shaped. *Stamens* erect, inserted near the base of the perigone tube, somewhat exserted.

Leaf anatomy. Upper unifacial part 4-grooved and 4-ribbed. Each rib with a large and two small vascular bundles with sclerenchymatic bundle sheaths against the epidermis. Rib margins glabrous, with subepidermal fibre bundles. Epidermal cells rather large with thick outer cell walls, and in the grooves with high papillae. *Styloids* scattered in the mesophyll and sometimes subepidermal in the ends of the U-shaped parenchymatic bundle sheaths; short crystals absent.

This section comprises a single polyploid species, mainly from the south-eastern districts of the Cape Province.









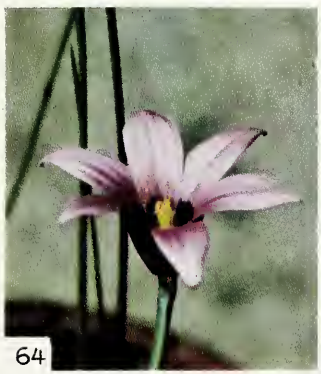




FIG. 60.
R. minutiflora. Natural size.

FIG. 61.
R. dichotoma. Natural size.

FIG. 62.
R. pratensis. Natural size.

FIG. 63.
R. jugicola. Natural size.

FIG. 64.
R. obscura var. *blanda*, $\times \frac{3}{4}$.

FIG. 65.
R. obscura var. *campestris.* Natural size.

43. **Romulea pratensis** De Vos sp. nov.

Fig. 62, 66.

Cormus 7—10 mm diam., basi obliquus, crista parva lunata basilari, tunicis rigidis laevibus brunneis, basi serie dentium vel fibrillarum acute curvatarum tandem in crista effractarum, apice fibris 2—5 mm longis praedito. *Caulis* brevis vaginis foliorum obtectus. *Vaginae basilares* 1—3 vel nullae manifestae. *Folia* 5 vel plura basilaria filiformia subteretia vel compresso-cylindrica 12—25 cm longa 1—2 mm diam. plerumque curvata, sulcis angustis, basibus vaginantibus ad 5 mm latis. *Pedunculi* plerumque 30—70 mm longi semiteretes, post anthesin ad 120 mm elongati. *Bractea* viridis vel interdum pallide viridis submembranacea in dimidio inferiore, anguste triangularis 10—15 mm longa, marginibus membranaceis perangustis aegre manifestis, acuta. *Bracteola* plerumque paulo minor quam bractea, submembranacea in dimidio inferiore, viridis in dimidio superiore, marginibus membranaceis latis brunneo-punctatis vel incoloratis. *Flores* 1—4 vel plures, 12—24 mm longi. *Tubus perigonii* 2—3,5 mm longus anguste infundibularis; *segmenta* anguste elliptica 8—15 mm longa 3—5 mm lata subacuta vel subobtusa, pallide lilacino-rosea vel albida, basi viridi-flava, in fauce plerumque 1—3 striis tenuibus atratis; segmenta exteriora interdum intus rosea vel malvina, a dorso viridia striis 3 fuscis vel brunneo-purpurea. *Stamina* erecta supra dimidium perigonii attingentia; *filamenta* 3—4 mm longa, aliquando longitudine inaequalia, basi leviter pilosa vel glabrata; *antherae* 3—4 mm longae flavidae. *Ovarium* 3—5 mm longum; *stylus* 6—8 mm longus, stigmatibus brevibus, saepe apices antherarum attingentibus. *Capsulae* 10—13 mm longae breviter cylindraceae in pedunculis primo curvatis tandem erectis.

Holotype: *Dyer 1619* in GRA. Isotype in PRE.

Plants 12—25 cm tall. *Corm* 7—10 mm diam., oblique at the base, with a small, often high, crescent-shaped basal ridge: tunics hard, smooth, brown, with apical fibres 2—5 mm long and a basal row of very sharply bent teeth or fibrils which ultimately break on the ridge into slender, parallel fibril clusters forked at their ends. *Stem* short, hidden by sheathing leaf bases. *Basal sheaths* 1—3, up to 25 mm long, or none visible. *Leaves* 5 or more, basal, filiform, subterete to compressed cylindrical, 12—25 cm long, 1—2 mm diam., usually bent, grooves narrow, sheathing leaf bases up to 5 mm wide. *Peduncles* mostly 30—70 mm long, rather stout, semiterete, elongating up to 120 mm after flowering. *Bract* green, often paler green and submembranous in the lower half, narrowly triangular, 10—15 mm long, with very narrow, hardly visible membranous margins, acute, often reaching more than halfway up perigone. *Bracteole* frequently slightly smaller than the bract, green in the upper half, somewhat membranous in the lower, with wide, brown-speckled or colourless

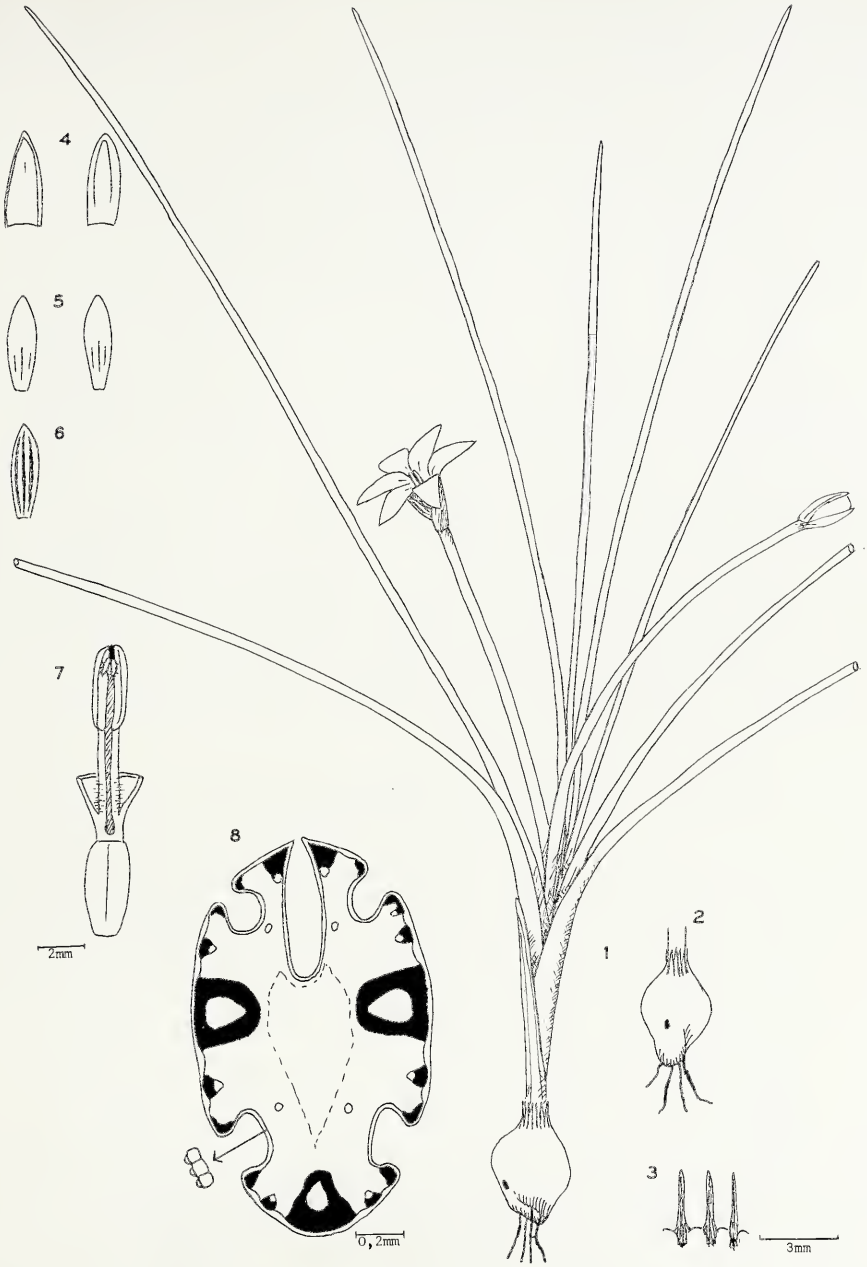


FIG. 66.

R. pratensis (*de Vos* no. *1734*, *1743*). 1, plant ×1. 2, corm seen from another angle. 3, a few groups of tunical teeth at base of corm. 4, bract and bracteole ×1. 5, perianth segments, upper surface. 6, outer segment, lower surface. 7, pistil, stamens, and perianth tube. 8, transverse section of leaf.

membranous margins. *Flowers* 1—4 or more, 12—24 mm long. *Perigone tube* 2—3,5 mm long, narrowly funnel-shaped; *segments* narrowly elliptical, 8—15 mm long, 3—5 mm wide, subacute or subobtuse, pale rose or lilac-rose (RHS 75B–C) to almost white, cup greenish-yellow, often with 1—3 short dark lines in the throat, outer segments sometimes darker pink or mauve inside, on the backs green with 3 dark lines, or brownish-purple. *Stamens* erect, reaching more than halfway up the perigone; *filaments* 3—4 mm long, sometimes unequal in length, slightly pilose at the base or glabrate; *anthers* 3—4 mm long, yellow, somewhat exserted. *Ovary* 3—5 mm long; *style* 6—8 mm long; *stigmas* spatulate, often reaching to the anther tips. *Capsules* 10—13 mm long, shortly cylindrical, on peduncles which curve after flowering, later erect. *Chromosome number* 2n = 44 (*de Vos 1743*, *STE 30195*, *Guillarmod 5239*).

UNIONDALE. Top of Prince Alfred's Pass: *de Vos 2080*, *2211*.

UITENHAGE. Van Stadens Pass: *de Vos 1743*. Hell's Gate Kloof, Winterhoek Mts.: *Fries*, *Norlindh & Weimarck 1053* (PRE, K, S).

PORT ELIZABETH. *I. L. Drège 263* (GRA). *Fries*, *Norlindh & Weimarck 462* (PRE, S).

ALBANY. Near and in Grahamstown: *Dyer 1619*. Grahamstown: *Daly & Sole 284*, *315* (GRA), *Guillarmod 5239*, *5241* (STE). Drostdy grounds: *de Vos 1734*. Drostdy Lodge: *Martin STE 30195*.

ALEXANDRIA. Gush's farm, Bushmans River Poort: *Johnson 1022*.

WITHOUT LOCALITY. *Verreaux* ann. 1831 sub *R. cruciata* var. *parviflora* Beg. (G). *Drège* Irid. 198 sub *R. cruciata* var. *vulgaris* Beg. (G partly). *Colbet*, de Verreaux (P).

Flowering period July to September.

In grassveld.

Specimens of this species have been identified mistakenly as *R. cruciata* var. *vulgaris* Beg., *R. cruciata* var. *parviflora* Beg. and *R. rosea* var. *neglecta* de Vos.

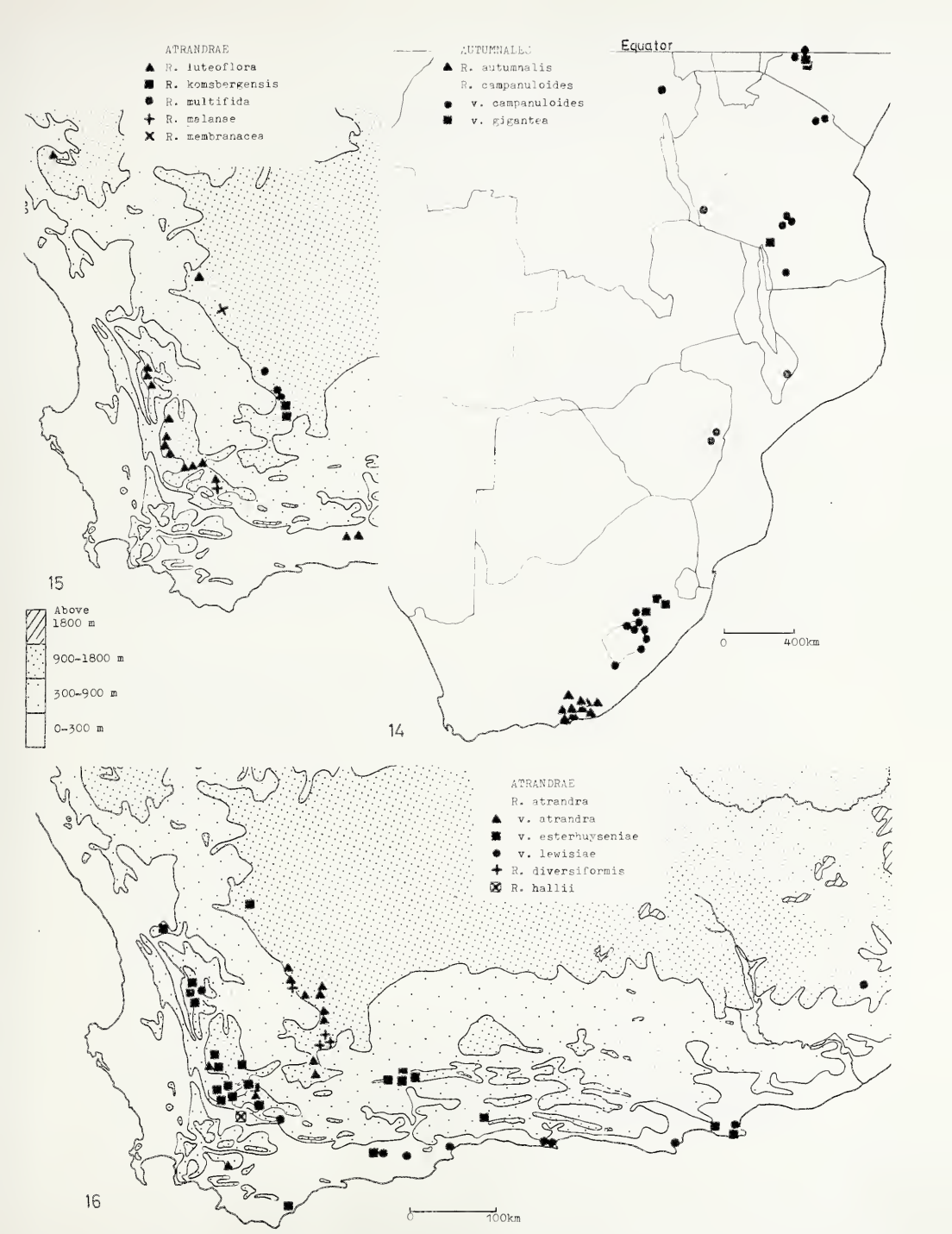
In numerous herbarium specimens the only readily discernible difference between this species and *R. rosea* var. *australis* is the corm which here has a crescent-shaped basal ridge with a single or double row of parallel fibril clusters. Other features distinguishing *R. pratensis* from this variety of *R. rosea* are the slightly greener bract, somewhat more exserted stamens with less hairy filaments and, in fresh specimens, a paler pinkish perianth with the three outer segments sometimes darker pink than the inner.

The corm resembles that of the section Aggregatae, but as *R. pratensis* differs considerably from this section in morphology as well as in chromosome number, it has not been included with this section.

The species is polyploid, possibly an alloploid which originated after chromosome doubling in a hybrid. *R. minutiflora* and *R. rosea* var. *australis* have been suggested as possible parental species (see under Phylogeny).

Maps 14–16.

Geographical distribution: 14, species of subsection *Autumnales;* 15, 16, subsection *Atrandrae*.


ATRANDRAE
R. luteoflora
R. komsbergensis
R. multifida
R. malanse
R. membranacea
15
Above 1800 m
900-1800 m
300-900 m
0-300 m
AUTUMNALIS
R. autumnalis
R. campanuloides
v. campanuloides
v. gigantea
Equator
0
400km
14
ATRANDRAE
R. atrandra
v. atrandra
v. esterhuyseniae
v. lewisiae
R. diversiformis
R. hallii
16
0
100km

5 Section Roseae Beg.

Stirps *Roseae* Béguinot 1909 p. 60 pro parte.

Corm slightly asymmetrical, rounded or pointed at the base; tunics split into bent or straight, acuminate teeth at the base. *Stem* generally short, hidden by sheathing leaf bases. *Leaves* several, generally basal, terete to compressed cylindrical or rarely cross-shaped in transverse section, up to 4 mm diam., grooves narrow or sometimes wide. *Peduncles* usually rather long, mostly bending after flowering or sometimes coiling up or remaining erect. *Flowers* large to small, magenta to pink, or white, apricot or yellow, the cup usually yellow, often with dark blotches in the throat. *Perigone tube* short, usually funnel-shaped. *Stamens* usually erect, inserted near the base of the perigone tube.

Leaf anatomy. Upper half unifacial, 4-grooved and 4-ribbed. Each rib with a large and generally 2—4 small vascular bundles, with massive sclerenchymatic sheaths against the epidermis. Rib margins generally rounded, mostly glabrous, with subepidermal fibre bundles, and in the *Atrandrae* with a small associating vascular strand. Epidermis on the ribs small-celled and thick-walled and in the grooves papillose or sometimes without papillae. Styloids scattered in the mesophyll and often subepidermal in the ends of the U-shaped parenchymatic bundle sheaths; short subepidermal crystals in the costal zones in the *Atrandrae* and *Autumnales*.

Type species: *R. rosea* (L.) Eckl.

The five subsections are allied, notwithstanding some differences in the chromosome numbers. Distinguishing features for the subsections are the manner in which the corm tunics split at the bases of the corms, and whether the peduncles curl up or straighten when the mature capsules dry out. Subsection *Atrandrae* is further distinguished by its leaf anatomy and often more membranous bract and bracteole, and subsection *Cruciatae* by the retarded dehiscence of its capsules.

Only five of the numerous species which Béguinot placed in the stirps *Roseae* are retained in the section Roseae. Species with elongated stems, e.g. *R. longipes* and *R. gigantea*, are transferred to the sections where they belong, as well as species with wide basal ridges on their corms, such as *R. gracillima* and *R. minutiflora*. The two north African species (*R. fischeri* Pax and *R. cameroonіana* Bkr.) are not under consideration, and *R. spiralis* is a *Geissorhiza* (see under Excluded Species).

5.1 Subsection Autumnales De Vos subsect. nov.

Cormus basi oblique acutus, tunicis basi tenuisectis in crista perpusilla. *Bractea* et *bracteola* virides marginibus membranaceis tenuibus incoloratis. *Flores* plerumque magentei vel rosei, basi lutei vel viridi-flavi.

Type species: *R. autumnalis* L. Bol.

Corm obliquely pointed at the base; corm tunics at the base split into slender parallel fibrils or teeth on a very small ridge. *Leaves* up to 2 mm diam., with narrow grooves. *Bract* and *bracteole* green, with narrow, colourless, membranous margins. *Flowers* usually longer than 25 mm, magenta or pink or sometimes white, cup mostly yellow or greenish-yellow, the outer segments often with longitudinal stripes on the backs.

Leaf anatomy. Rib margins without a vascular strand against the fibre bundles. Epidermis in the grooves with a small central protrusion on each cell. Short crystals numerous, subepidermal in the costal zones.

The two species of this subsection are a closely allied pair, the one a lowland species of the eastern Cape Province, and the other occurring on the mountain ranges and high plateaux of south-eastern and east Africa. They do not occur west of 24° east longitude.

Béguinot (1909) placed *R. campanuloides*, the only species then known, with the Roseae to which it is undoubtedly related. It differs from subsection Roseae in the splitting of the tunics at the base of the corm, in leaf anatomy (subepidermal crystals), and in the colourless membranous margins of the bracts and bracteoles. It is therefore placed in a distinct subsection, together with *R. autumnalis*.

44. **Romulea autumnalis** L. Bol. J. Bot. 69: 12 (1931); Martin & Noel 1960 p. 30. *R. rosea* Eckl. var. *speciosa* Baker 1896 p. 42 in herb. pro parte.

Icones: Gledhill 1971 Pl. 15 Fig. 8; this work Fig. 67.

Plants 15—35 cm tall. *Corm* obovoid, 10—20 mm diam., obliquely pointed at the base, tunics hard or membranous, smooth, brown to dark brown, with parallel fibrils at the base on a very small basal ridge, and short apical teeth and fibres 5—10 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* usually 2, 10—60 mm long. *Leaves* 3—4 or more, basal, filiform, subterete to compressed cylindrical, 10—35 cm long, 1 to almost 2 mm diam., suberect or sometimes curved, prominently veined in dried specimens, grooves narrow, sheathing leaf bases 3—6 mm wide. *Peduncles* 50—180 mm long, semiterete, suberect. *Bract* green or greenish, with very narrow membranous margins, narrowly triangular, 17—25 mm long, finely striate, acute or acuminate. *Bracteole* with wide colourless membranous margins narrowing towards the tip. *Flowers* 1—3, sometimes 4, 25—40 mm long. *Perigone tube* 5—7 mm long, funnel-shaped; *segments* narrowly obovate to narrowly elliptical, 18—30 mm long, 6—12 mm wide, acute to obtuse, pink, magenta-pink (RHS 65A, 68A–C) to white, with a yellow or orange-yellow cup, the outer segments pale green on the backs with 3—5 purplish veins and often fine feathered veining towards the margins. *Stamens* erect, inserted in the lower half of the perigone tube, usually not reaching halfway



FIG. 67.

R. autumnalis (*de Vos* no. *1733*). 1, plant $\times\frac{7}{8}$. 2, corm seen from opposite side. 3, outer and inner perianth segments. 4, outer segment, lower surface. 5, bract and bracteole $\times 1$. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf.

up the perigone; *filaments* 4—10 mm long, pilose in the lower half, orange-yellow; *anthers* 6—8 mm long, sometimes shorter, golden-yellow. *Style* 8—12 mm long, style branches and stigmas to 3 mm long, reaching the anther tips or just below them. *Capsules* ca. 10 mm long, on erect peduncles. *Chromosome number* 2n = 22 (*de Vos 1733*).

Lectotype: *Dyer 2414* in BOL.

SOMERSET EAST. Suurberg: *Bayliss 1263* (NBG).
UITENHAGE. Nanaga: *Long 185* (GRA, BOL, K).
PORT ELIZABETH. Addo Heights: *Long, Fl. E. Cape 975* (PRE, K). Thornhill roadside: *de Vos 2210*.
ALBANY. Grahamstown: *Pappe* SAM 20707, *MacOwan 246* (GRA, K partly). Slaagkraal: *Zeyher 4037* (GRA). Salatkraal(?): *Zeyher 911* partly (GRA). Near Grahamstown: *Schlechter 2614* (GRA, PRE, Z). Grahamstown commonage: *Dyer 2414* (BOL), *Cheadle 718* (PRE), *Martin STE 30219*. 8 mls. E of Grahamstown: *Lewis 4437* (SAM). Near Fort Selwyn: *Martin STE 30220*. Between Grahamstown and Kariga: *Dyer 2421* (BOL). Alicedale: *Cruden 248* (GRA, STE). On Highlands road, 5½ mls. from Grahamstown: *Guillarmod 5407* (RUH). Waainek: *Guillarmod 5408* (RUH). Albany: *Cooper 3184* (K).
ALEXANDRIA. *Galpin 10839* (PRE, K), *Galpin* s.n. (BOL), *de Vos STE 18962, 18963*. Suurberg near Sanatorium: *Schonland 3205* (GRA, PRE). Suurberg Pass: *Nordenstam 331* (M). Beacon Hill, Suurberg Inn: *Archibald 7317/b*. Nuweposkop Valley: *Archibald 5888*. Waaiheuwel—De Kol road: *Archibald 7350, 7352* (RUH). 7 mls. N of Alexandria: *de Vos 1733*.
BATHURST. Port Alfred, grassy flats on W bank: *Acocks 17701* (PRE, K). Kleinmond: *White* July 1899 (GRA).
VICTORIA EAST—KING WILLIAM'S TOWN. Summit of Hog's Back: *Scully 246* (SAM).
WITHOUT LOCALITY. Eastern districts: *MacOwan 250* (S).

Flowering period April to July.

On grassy flats and hills at low altitudes up to 650 metres.

This is characterised by flowers, short stem, and leaves of the Roseae type. It differs, however, from *R. rosea* in its corm with a basal point, its leaves with subepidermal short crystals in the costal zones, in its bracteoles with white or colourless membranous margins, also in its chromosome number and different flowering period.

It is closely allied to *R. campanuloides* and shows the same type of corm, with a minute basal ridge on which narrow parallel fibrils converge to a basal point (best seen in younger specimens). It is distinguished from the latter species by proportionally shorter stamens and style which mostly do not reach half-way up the perianth, by bracteoles with wider membranous margins, and, from the typical variety of *R. campanuloides*, by its less erect leaves with slightly less sclerenchyma and its larger flowers.

The narrow parallel fibrils and small ridge at the base of the corm, as well as the colourless membranous margins of the bracteoles, distinguish *R. autumnalis* from the other species with obovoid corms, namely *R. eximia* and *R. cruciata*.

MacOwan 246 which was cited by Baker as *R. rosea* var. *speciosa*, is this species.



FIG. 68.

R. campanuloides var. *campanuloides* (*de Vos* no. *2187*). 1, plant ×1. 2, corm seen from opposite side. 3, outer and inner perianth segments, lower surface ×¾. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, transverse section of leaf.

45. **Romulea campanuloides** Harms, Bot. Jb. 19 Beibl. 47: 28 (1894).

Plants 10—55 cm tall. *Corm* subobovoid, 5—20 mm diam., obliquely pointed at the base, tunics hard or membranous, smooth or sometimes somewhat fibrous, with slender parallel fibrils at the base on a very small basal ridge, and apical fibres 5—25 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* 2. *Leaves* 1—3 or sometimes more, basal, filiform, subterete to compressed cylindrical, 8—55 cm long, 0,8—2 mm diam., erect, with prominent veins, grooves narrow, sheathing leaf bases 2—4 mm wide. *Peduncles* 30—130 mm long, sometimes elongating to 220 mm in fruiting specimens, semiterete, suberect. *Bract* and *bracteole* green with narrow colourless membranous margins which are sometimes hardly visible, narrowly triangular, 10—25 mm long, reaching above the middle of the perigone, finely striate, acuminate or acute. *Flowers* 1—2, 15—35 mm long. *Perigone tube* 4—8 mm long, funnel-shaped; *segments* narrowly elliptical to narrowly obovate, 9—25 mm long, 4—8 mm wide, acute to obtuse, white to deep pink or magenta-pink, with a yellow or greenish-yellow cup, the outer segments magenta or greenish and sometimes striped on the backs with 3—5 violet longitudinal lines. *Stamens* erect, inserted in the lower half of the perigone tube, usually reaching more than halfway up the perigone; *filaments* ca. 4—7 mm long, glabrescent or puberulous near the base; *anthers* 3—7 mm long, sometimes with purplish longitudinal lines. *Style* 8—17 mm long; *stigmas* below or at the anther tips or overtopping them by 1—4 mm. *Half-ripe capsules* 8 mm long on erect peduncles.

Type: The holotype in B was probably destroyed during the last war, as it was unobtainable for examination, except for *Volkens 782A* consisting of fruiting specimens only. The isotype, *Volkens 782* in K, is chosen as lectotype. Another isotype in BM.

On stony or grassy plateaux of the Drakensberg and East African mountains, ca. 1500–3 000 m in altitude.

This is the only species of Romulea in South Africa with a range extending beyond the borders of the Republic. Specimens from the Drakensberg were described as *R. thodei*, but examination of the type specimens showed that this species and *R. campanuloides* from Central Africa constitute a single species.

The species has the flower and short stem of the Roseae, but is distinguished by its corm with a pointed base and a very small basal ridge, bracteoles with colourless membranous margins, by the presence of subepidermal crystals in the costal zones in the leaves, and by its chromosome number. It stands very near the low altitude species *R. autumnalis* of the Eastern Cape Province, but is readily distinguished by its stamens which reach higher up the perianth and by more herbaceous bracteoles with narrower membranous margins.

The variety *gigantea* differs from the typical variety in its larger bracts and

flowers, with stigmas overtopping the anthers. The slightly wider leaves have two additional small vascular bundles in each rib and the sclerenchyma is more massive, frequently forming a continuous subepidermal layer in each leaf rib. Two collections connect the two varieties: *Wood 9546*, here listed with var. *campanuloides*, has somewhat intermediate characters, and *Geesteranus 6040* in Kew consists of larger specimens and in PRE and S of smaller specimens.

KEY TO THE VARIETIES

1 Style 7—10 mm long; stigmas below or at or rarely above tips of anthers; flowers mostly less than 25 mm long a. var. *campanuloides*
1 Style 15 mm or longer; stigmas mostly overtopping anthers; flowers 25 mm or longer. b. var. *gigantea*

a. Var. **campanuloides**

R. campanuloides Harms 1894 p. 28; Baker 1898 p. 345; Béguinot 1907b p. 104 et p. 472 et 1909 p. 74. *R. alpina* Rendle 1895 p. 376 et p. 401—holotype: *Taylor* 1888 (BM). *R. thodei* Schlechter 1898 p. 318—type: *Thode* 1896 (B holo, BOL, STE); Béguinot 1907b p. 104 et 1909 p. 72; Burtt 1970 p. 85.

R. rosea auct. non Eckl.: Baker 1896 p. 42 pro parte; Wood 1908 p. 232. *R. linaresii* Parl. ssp. *abyssinica* auct. non Parl. nec Beg.: Norlindh & Weimarck 1937 p. 173.

Icones: Engler 1908 p. 369; Trauseld 1969 p. 34; this work Fig. 68.

Smaller plants with all organs smaller. *Leaves* ca. 1 mm or less in diam. *Flowers* 15—28 mm long, mostly ca. 20 mm. *Perigone tube* 3—7 mm long, often greenish-yellow inside; *segments* 4—5 mm wide, pink or magenta-pink, outer segments often with 3—5 mauve or violet lines on the backs. *Stamens* reaching up to three-quarters up the perigone; one filament sometimes shorter than the others; *anthers* 3—5 mm long, sometimes slightly shorter than filaments. *Style* 7—10 mm long; *stigmas* at or below or rarely overtopping the anthers slightly. *Chromosome number* 2n = 22 (*de Vos 2187*).

CAPE PROVINCE. BARKLY EAST—MACLEAR boundary. Naudésnek summit: *de Vos 2187*.

O.F.S. Mont aux Sources, wet sandy places on summit: *Thode* Jan. 1896 sub *R. thodei* Schltr. (BOL, STE, B); stony places on summit: *Thode STE 6291*.

NATAL. Top of Mt. Erskine, swampy places: *Evans 373* (NU, K). Van Reenen: *Wood 9546* (NU, L). Cathedral Peak Forest Station: *Killick & Vahrmeijer 3549* (PRE, K). Sani Pass, Underberg: *Killick & Vahrmeijer 3736* (PRE). Giants Castle Game Reserve, Underberg: *Trauseld 976* (PRE).

LESOTHO. Butha Buthe, montane grassland near Oxbow River: *Troughton B94* (GRA). Top of Mpojoa Stream, on flat grassy slope: *Guillarmod 2096A* (PRE).

RHODESIA. Inyanga, ad pedis montis Inyangani: *Norlindh & Weimarck 5055* (SAM, BM, LD, S) sub *R. linaresii* subsp. *abyssinica* Beg. Umtali, Himalayas Engwa, in short mountain grassland: *Wild 4484* (GHSR).

TANZANIA. Iringa Distr: *Polhill & Paulo 1882* (K). Iringa Distr., Dabaga: *Troll 5439* (B,) Iringa Distr., Selebu, Image Mt.: *Carmichael 370* (EA). Kilimanjaro higher slopes to 10 000 ft.: *Taylor 1888* (BM) sub *R. alpina* Rendle. Kilimanjaro, Bergwiese oberhalb des Urwaldes. *Volkens 782, 782A* (B, BM, K). Songea Distr., Matengo Hills: *Taylor 8095* (K). Ufipa Distr.: Mmemya Mt.: *Bullock 3717* (K).

KENYA. Escarpment 7 mls. W of Thompson's Falls: *Lacey 13A* (K). Rift Valley Province, Nakuru Distr.: *Geesteranus 6040B* (PRE, S).
BELGIAN CONGO. Sud Karisimbi: *de Witte 2310* (P).

Flowering period January to October.

b. Var. **gigantea** (De Vos) De Vos comb. nov.

R. thodei Schltr. ssp. *gigantea* De Vos, Jl S. Afr. Bot. 21: 106 (1955)—holotype: *Thode 3924* (STE).

Icon: de Vos 1955 p. 107.

Larger plants with larger organs. *Leaves* 1—2 mm diam. *Flowers* 25—35 mm long, varying from white to deep pink, with a bright yellow cup and outer segments on backs pale green or with dark veins. *Perigone tube* 6—8 mm long; *segments* 6—8 mm wide. *Stamens* reaching just above the middle of the perigone; *anthers* 5—7 mm long, subequal to the filaments. *Style* 15—17 mm long; *stigmas* mostly overtopping the anthers.

Holotype: *Thode STE 3924* in STE.

O.F.S. Van Reenen's Pass, 6000 ft.: *Thode STE 3916*.
NATAL. Altemooi: *Thode STE 3924, 3923, 3918*. Tweekloof, Altemooi: *Thode A1186* (PRE, K). Nouhoek, Utrecht: *Devenish 336* (PRE).
TRANSVAAL. Oshoek, Wakkerstroom: *Devenish 1087* (PRE, K).
TANZANIA. Njombe Distr., Kipengere Mts.: *Richards 14010* (K).
KENYA. Nakuru Distr., Eastern Mau Forest Reserve: *Geesteranus 6040* (K). Gilgil: *Dowson 646* (K).

Flowering period December to February.

5.2 Subsection Atrandrae De Vos subsect. nov.

Cormus basi plerumque rotundatus; tunicae basi in dentibus validis acuminatis, plerumque ad unum latus curvatis fissae· *Folia* 1—4 mm diam., marginibus porcarum plerumque fasciculo vasculari minuto praeditis, sulcis angustis vel latis. *Pedunculi* plerumque circinati sub capsulis siccis maturis. *Bractea* et *bracteola* virides marginibus apicibusque membranaceis, vel submembranaceae viridulae in medio dimidii superioris. *Flores* plerumque magni vel mediocres, magentei vel rosei vel albi vel lutei, saepe in fauce maculis vel nervis fuscis praediti. *Antherae* saepe primo apicibus conjunctae vel incurvatae.

Type species: *R. atrandra* G. J. Lewis.

Corm generally rounded at the base, rarely pointed; tunics split into stout, generally bent, acuminate, basal teeth which are grooved on the bend. *Leaves* 1—4 mm diam., grooves narrow or wide. *Peduncles* generally coiled up below the dry, ripe capsules, or sometimes bent. *Bract* and *bracteole* green with membranous margins and tips, or submembranous and greenish in centre of upper half. *Flowers* generally longer than 25 mm, magenta, pink, white, or

yellow, often with dark blotches or veins in the throat. *Anthers* often at first joined at the tips or incurved. *Stigmas* rarely more than 6.

Leaf anatomy. Rib margins usually with a small associating vascular strand against the fibre bundle (except in *R. diversiformis*). Epidermis in the grooves with papillae, rarely without. Short subepidermal crystals numerous in the costal zones (except in *R. malaniae* and *R. membranacea*); styloids scattered, and in species without short crystals in the ends of the U-shaped parenchymatic bundle sheaths.

The species of this subsection are absent from the Cape Peninsula and the neighbouring districts of Malmesbury, Paarl, Stellenbosch, Somerset West, and the Strand.

R. komsbergensis and *R. multifida* are a closely allied species pair, and so are *R. atrandra* and *R. hallii*. *R. luteoflora* also stands close to the latter pair, notwithstanding its different chromosome number. The flowers of *R. diversiformis* and *R. malaniae* differ from the above-mentioned species in several details, but their vegetative characters, including the main features of their leaf structure, are similar to the first five species, and they are also included in this subsection. *R. membranacea* is best placed with this subsection, notwithstanding its corm with a pointed base. With this one exception the grooved bent teeth at the base of the corm are a constant feature of this subsection. Subsection Atrandrae differs from subsection Roseae in the presence of small vascular strands against the fibre bundles of the leaf rib margins (to be seen in transverse sections) which are rarely absent, and of short subepidermal crystals in the costal zones of the leaves, as well as in the above-mentioned grooving of the teeth at the base of the corm. Their chromosome numbers also differ.

46. **Romulea luteoflora** (De Vos) De Vos stat. nov.

R. atrandra G. J. Lewis var. *luteoflora* De Vos, Flow. Pl. Afr. 29; 1135 (1952b) et 1965 p. 138, 140.

Icon: Flow. Pl. Afr. 1.c.

Plants 10—40 cm tall. *Corm* subglobose, 5—20 mm diam., tunics hard, smooth, brown, split into grooved basal teeth sharply bent towards one side, and apical fibres 5—10 mm long. *Stem* short or to 40 mm long, hidden by the leaf bases. *Basal sheaths* usually 2, 10—50 mm long. *Leaves* 2—5 or more, basal, filiform or subterete, 8—40 cm long, 0,5—1 mm or up to 2 mm diam., suberect or arcuate, with a prominent vein in each rib, grooves usually wide, sheathing leaf bases to 5 mm wide. *Peduncles* 40—140 mm long, subterete. *Bract* green, ovate, concave, 12—25 mm long, with very narrow membranous margins and a membranous, usually brown-streaked tip, obtuse, acute or often slightly lacerated. *Bracteole* sometimes slightly longer and narrower than the bract, with wide, brown-streaked or sometimes colourless membranous margins

and tip. *Flowers* 1—5 or more, 25—40 mm or sometimes to 45 mm long. *Perigone tube* 4,5—6 mm long, cup-shaped or sometimes funnel-shaped; *segments* subequal or the inner slightly wider than the outer, 18—35 mm long, 8—15 mm wide, obovate to narrowly obovate, the outer segments often almost elliptical, reflexed in the open flower, acute or subacute, occasionally subapiculate, buttercup-yellow (RHS 7B, 13B), on each segment in the throat a dark reddish-brown blotch which is sometimes reduced to three dark lines, outer segments with 5 brown-black longitudinal veins on the backs and fine feathered veining in between, or sometimes irregularly speckled with dark brown. *Stamens* erect or suberect, reaching about halfway up the perigone or lower; *filaments* 4—7 mm long, pilose in the lower half, yellow; *anthers* 6—9 mm long, incurved and at first joined at the tips, dark brown or sometimes yellow, pollen yellow. *Style* 7—12 mm long; *stigmas* reaching to the middle of the anthers or somewhat higher but not up to their tips. *Capsules* to 15 mm long, shortly cylindrical; on recurved peduncles which later coil up. *Chromosome number* 2n = 20 (*de Vos 1570*, *1615*).

Holotype: *de Vos 1570* in STE.

NAMAQUALAND. Kamiesberge, Garies-Leliefontein road: *de Vos 1615*.
CALVINIA. Hantamberge top: *Marloth 12794* (PRE).
CLANWILLIAM. Cedarberg between Crystal Pool and Bushman's Cave: *Barnes BOL 19471*. Cedarberg, flowered at Kirstenbosch: *Lamb NBG 1633/30*. N Cedarberg Mts., shale band: *Esterhuysen BOL 24350*. Sanddrift below Wolfsberg: *de Vos 2031*.
CERES. Driefontein, Cold Bokkeveld: *Marloth 6137* (PRE, STE). Leeurivier: *Compton 17434* partly (NBG). Koue Bokkeveld: 33 mls. from Ceres, *de Vos 2000*. North of Gydouw Pass: *Leighton 1288* (BOL), *Lewis 2666* (SAM), *de Vos 1275*. Gydouw: *Leipoldt 4442* (BOL). Summit of Gydouw Pass: *Salter 4708* (BOL, K), *Lewis 1400* (SAM). Top of Theronsberg Pass: *de Vos 1570*. Western slopes of Theronsberg: *de Vos 1677*. Karoopoort: *L. Bolus BOL 20739*.
WORCESTER. Matroosberg station: *de Vos 2097*.
RIVERSDALE. Albertinia: *Marloth 5627*, *5573B* (PRE). Between Riversdale and Albertinia: *de Vos 2160*.

Flowering period end of July to September.

This species stands close to *R. atrandra* Lewis and was originally described as *R. atrandra* var. *luteoflora*. The two species are characterised by similar corms and short stems, similar bracts and bracteoles with membranous tips, the bracteoles with wide membranous margins, and by peduncles which coil up when the capsules dry out. *R. luteoflora* differs from *R. atrandra* in its yellow perianth, mostly with a cup-shaped perianth tube which widens directly from the base, and in the chromosome number. On account of these differences *R. luteoflora* has been made a distinct species.

Hybrids between the two species have been obtained (de Vos 1965). This also indicates their close affinity. The hybrids had a white or pale lilac perianth, leaves intermediate in width, and 21 chromosomes. More than 50% of the pollen grains were distinctly abnormal. The hybrids were only slightly fertile, producing 1—9 seeds per capsule. Very few plants were obtained from these seeds, some with 21 and others with 22 chromosomes.

47. **Romulea atrandra** G. J. Lewis, Flow. Pl. S. Afr. 14: 544 (1934).

Plants 10—40 cm tall. *Corm* subglobose or obovoid, 10—25 mm diam., tunics hard, smooth, brown, split into acuminate, grooved, basal teeth which are sharply bent towards one side and sometimes broken on the bend, and apical fibres 5—15 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* usually 2, 10—70 mm long. *Leaves* 4—8 or more, basal, sometimes distinctly 2-ranked, terete to compressed cylindrical, 6—25 cm or up to 40 cm long, 1—4 mm diam., arcuate or suberect, rigid, with a prominent vein in each rib, grooves narrow or wide, occasionally minutely ciliate, sheathing leaf bases up to 7 mm wide. *Peduncles* 30—150 mm long, subterete or almost semiterete. *Bract* green, narrowly ovate, concave, 10—30 mm long or sometimes shorter, with strong, closely-spaced veins, and brown-streaked or almost colourless, membranous margins and prominent acute, obtuse or somewhat lacerated membranous tip. *Bracteole* green with 2—4 mm wide, brown-streaked or rarely almost colourless membranous margins and prominent membranous tip. *Flowers* 1—5, 20—40 mm or to 45 mm long, sometimes only 15 mm. *Perigone tube* 4—8 mm long, funnel-shaped: *segments* subequal or the inner somewhat wider or narrower than the outer, 18—35 mm long, 3—15 mm wide, obovate or narrowly obovate, or outer segments almost elliptical, obtuse to subacute, sometimes apiculate, varying from magenta-rose to pale pink or white, with a violet-black blotch on each segment in the throat which is sometimes reduced to a few dark lines or is absent, the cup yellow with or without dark longitudinal lines, the outer segments greenish-yellow on the backs, usually with 5—7 dark longitudinal veins and feathered veining in between, the inner segments pale mauve or white on the backs, with purple or blue veining, and sometimes greenish-yellow tips. *Stamens* erect or suberect sometimes incurved, reaching about halfway up the perigone or lower; *filaments* 4—8 mm long, pilose in the lower half, slightly widened towards the base, yellow, sometimes dark purple; *anthers* 5—10 mm long or sometimes only 2,5 mm, joined or incurved at the tips, black, violet or yellow, pollen golden yellow. *Style* 6—10 mm long; *stigmas* 2—3 mm long, reaching to the middle of the anthers or lower or almost to the tips. *Capsules* shortly cylindrical or ellipsoid, 10—14 mm long, on bent peduncles which later curl up.

Holotype: *Lewis NBG 2703/32* in BOL. Isotype in PRE.

R. atrandra is variable as to leaf width, size and colouring of the flowers, colouring of the anthers, and intensity of brown streaking on the membranous margins of the bracts and bracteoles. Specimens occurring on mountain peaks and plateaux at higher altitudes form a distinct variety, var. *esterhuyseniae*, which differs from the typical in its narrower leaves, usually more intense brown streaking on the membranous margins of the bracts and bracteoles, and in the

perianths which vary from the typical rosy-magenta to white, with the violet-black blotches on the limbs and dark lines in the cup reduced or even absent. In some of the south coastal districts this variety, and another with smaller flowers, also occur at low altitudes.

The leaf width in this species is controlled genetically. Cultivated in the Stellenbosch botanic garden, the leaves more or less retain their original width in the following seasons. The brown streaking on the margins of the bracts and bracteoles, on the other hand, is influenced by the environment. In the botanic garden, where the plants get more water and less sunlight than in their natural habitat, the streaking becomes less and may even disappear in the following seasons.

Klatt identified *Burchell no. 1319* in the Kew herbarium with *Trichonema speciosum* and Baker placed it with *R. rosea* Eckl, as var. *speciosa* Baker. *R. atrandra*, however, does not resemble the coloured figure of *T. speciosum* Ker (1812), neither is there any justification to transfer it to *R. rosea*. It is distinguished from the latter species by its firmer bract and bracteole which are green in the centre and have strong, closely-spaced veins and prominent membranous margins and tips, by its chromosome number and also its leaf anatomy: *R. atrandra* has longitudinal rows of short subepidermal crystals in the costal zones and a small vascular bundle against each fibre bundle in the rib margins.

KEY TO THE VARIETIES

1 Flowers more than 25 mm long; perigone segments 8 mm wide or wider; outer segments generally with 5—7 longitudinal violet-coloured veins on the backs and fine feathered veining in between.
 2 Widest leaves more than 1 mm diam., with wide or narrow grooves; flowers mostly magenta-rose with large dark blotches in throat; cup yellow or orange, often with 5—7 or more dark longitudinal lines inside (best seen in fresh specimens) . a. var. *atrandra*
 2 Widest leaves 1 mm or less in diam., with narrow grooves; flowers mostly pink, lilac or white, with large or often small dark blotches in the throat or without blotches; cup yellow without dark lines or with median lines running down from the dark blotches. b. var. *esterhuyseniae*
1 Flowers 25 mm or less in length, rarely slightly longer; perigone segments less than 7 mm wide; outer segments often with 3 longitudinal dark veins on the backs . c. var. *lewisiae*

a. Var. **atrandra**

R. atrandra G. J. Lewis 1934 t. 544.

Icon: Ibid.

Leaves sometimes two-ranked, widest leaves more than 1 mm diam., with wide or narrow grooves. *Bract* and *bracteole* with brown-streaked or almost colourless membranous margins and tips. *Flowers* 25—45 mm long. *Perigone* mostly magenta-rose (RHS 64C, 68A), with a blue-black or violet blotch on each limb, cup yellow or orange-yellow, mostly with dark violet longitudinal lines. *Anthers* black, purple or yellow, reaching about halfway or less up the perigone. *Chromosome number* 2n = 22 (*STE 30191*).



FIG. 69.

R. atrandra var. *esterhuyseniae* (*de Vos* no. *2101*). 1, plant × 1. 2, corm seen from opposite side. 3, outer and inner perianth segments, lower surface. 4, bract and bracteole × 1. 5, pistil, stamens, and perianth tube. 6, mature capsule × 1. 7, transverse section of leaf.

CERES. Cold Bokkeveld: *de Vos 1996* partly.
WORCESTER. 13 mls. from Matroosberg station on road to Koo: *Loubser 2073* (NBG), *de Vos 2098*.
LAINGSBURG. Tweedside: *Lewis NBG 2703/32*. 25 mls. N of Matjiesfontein: *Theron 1257* (PRE, K).
SUTHERLAND. Jakhalsvlei: *Burchell 1319* (K). Damslaagte, Klein Roggeveld: *Olivier STE 30191*. N of Komsberg Pass: *de Vos 1595*, *1933*, *1949*. Near Sutherland: *Joubert STE 30193*, *de Vos 1944*. Geelhoek, 10 mls. WSW of Sutherland: *Acocks 16976* (PRE, K). Voëlfontein: *Hall 3246*, *3258*, *3259* (NBG).
CALEDON. Slopes W of Baths: *Purcell SAM 46256* partly.

Flowering period period July to September.

Mostly on inland plateaux, on stony or clayey ground.

b. Var. **esterhuyseniae** De Vos var. nov.

Fig. 69.

A typica foliis angustioribus, sulcis angustis, bracteis et bracteolis marginibus membranaceis distincte brunneo-striatis, perigonio varianti in colore ab albo ad roseo-magenteum, in fauce maculis atratis magnis vel saepe reductis vel deficientibus, staminibus luteis aliquando fuscis, distinguitur.

Holotype: *Esterhuysen 13924* in BOL. Isotypes in PRE, SAM, STE, K.

Widest leaves ca. 1 mm or less in diam., with narrow grooves. *Bract* and *bracteole* generally with distinctly brown-streaked membranous margins and tips. *Flowers* as large as var. *atrandra*, varying from magenta-pink to light lilac, pale pink (64D, 68A, 65C, D) or white inside, with the dark blotches in the throat large or often small or absent, or the throat with a pale transverse zone, cup yellow, sometimes with dark lines. *Anthers* mostly yellow, sometimes dark, reaching about halfway up p rigone. *Chromosome number* 2n = 22 (*Esterhuysen 31132* (STE).

VANRHYNSDORP. Gifberge: *Marloth 3017a* (PRE).
CALVINIA. Ripjoeni Mts., western slopes: *Marloth 10290* (PRE).
CLANWILLIAM. Cedarberg near Crystal pool: *Barnes BOL 19470*. Sneeuberg, Cedarberg Forest Reserve: *Taylor 5016* (PRE, K).
CERES. Top of Gydouw Pass: *Salter 2624* (BOL, K), *de Vos 1271*. Koue Bokkeveld: *de Vos 1996* partly, *1997*. N side of Matroosberg, sandy stony flats: *Esterhuysen 18719* (BOL, STE). Baviaansberg: *Jackson* s.n. (NBG).
WORCESTER. Waaihoek Peak, stony slopes recently snow-covered: *Esterhuysen 8994* (BOL). Chavonnesberg, slopes near rocky summit: *Esterhuysen 14568* (BOL, STE). Keeromberg, northern slopes: *Esterhuysen 31132* (BOL, STE). Between Matroosberg Station and Koo: *de Vos 2101*. 13 mls. from Matroosberg station to Koo: *Loubser 2073* (NBG). At turn-off to Matroosberg station: *de Vos 2156*. Top of Hex River Pass: *Stayner* 19.7.68 (NBG).
LADISMITH. Towerkop, Swartberge near Ladismith: *Esterhuysen 13924*. Klein Swartberg: *Wurts 1511* (NBG). Seweweekspoort: *Wurts 1161* (NBG). N side of Seweweekspoort: *Wurts 1468* (NBG).
HEIDELBERG. Palmyra: *de Vos 2231*.
RIVERSDALE. *Muir 4872* (K).
OUDTSHOORN. Langkloof Mts., Montagu Pass: *Castelman 26* (P).
PORT ELIZABETH. Near Port Elizabeth: *H. Bolus 2239* (K). Humewood: *Paterson 1129* (GRA) may be this variety.

Flowering period July to October.

Mainly on stony mountain slopes and peaks, sometimes on plains at low altitudes.

Occasionally the basal teeth of the corm tunics are so sharply bent that they break off on the bend, e.g. *Barnes* (*BOL 19470*) and *Castelnau 26* in P. This gives the corm the appearance of one with a pointed base and almost straight acuminate teeth.

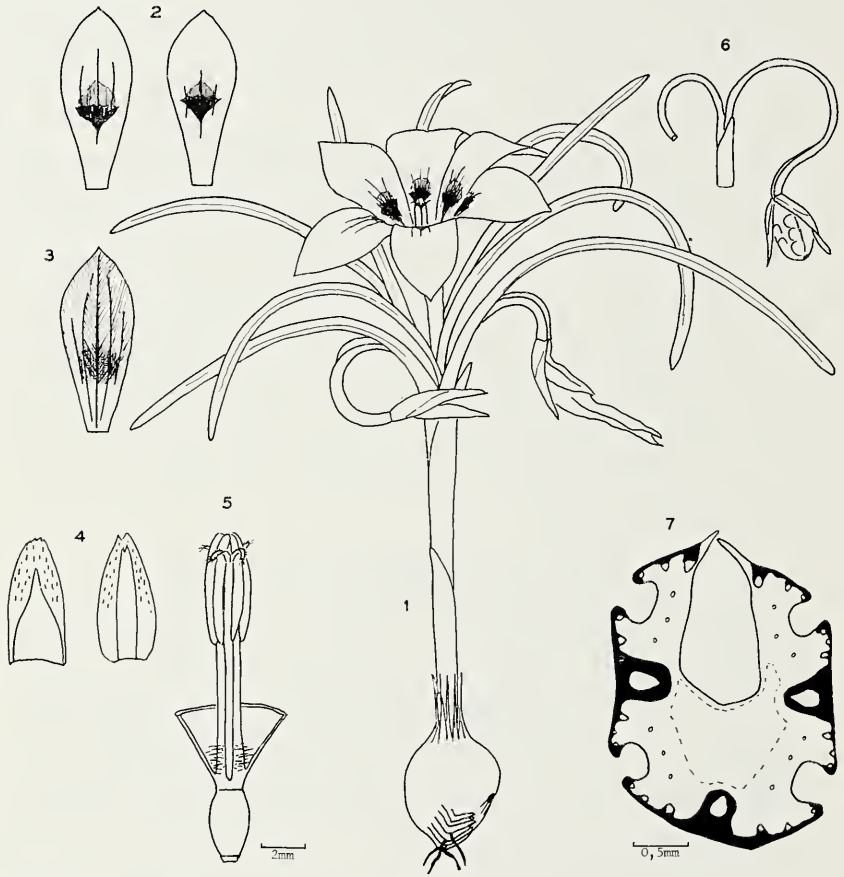


FIG. 70.

R. hallii (*de Vos* no. *2215*). 1, plant ×1. 2, outer and inner perianth segments, upper surface ×1. 3, outer segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, almost mature capsule ×1. 7, transverse section of leaf.

c. Var. **lewisiae** De Vos var. nov.

Icon: Batten & Bokelmann 1966 Pl. 28.2 sub *R. rosea* var. *neglecta.*

A typica bracteis et bracteolis et floribus parvioribus, segmentis perigonii albis vel roseo-lilacinis ad 7 mm latis, segmentis exterioribus saepe a dorso 3 nervis fulvis longitudinalibus ornatis, antheris flavis, foliis flexuosis angustioribus bene distinguitur.

Holotype: *Long Fl. E. Cape 617* in PRE. Isotypes in GRA and K.

Widest leaves ca. 1 mm or less in diam., flexuose or suberect, with narrow grooves. *Bract* with narrow membranous margins and a membranous tip. *Bracteole* with the typical wide, brown-streaked, membranous margins and tip, but only 9—15 mm long. *Flowers* 15—25 mm long, rarely slightly longer. *Perigone segments* 3—7 mm wide, pale lilac-pink to white, outer segments frequently with 3 dark longitudinal veins on the backs. *Anthers* 2,5—6 mm long, yellow, reaching more than halfway up the perigone.

CLANWILLIAM. Cedarberg: *Lamb NBG 1162/30* (BOL).
MONTAGU. Montagu Baths: *Page* Aug. 1920 (PRE).
RIVERSDALE. *Muir 949* (BOL). Albertinia: *Muir 715* (PRE partly, not in BOL).
MOSSEL BAY. Little Brak River: *Lewis NBG 1105/37, BOL 24775.*
KNYSNA. Nature's Valley: *Acocks 21164* partly (PRE, M, not in K). Plettenberg Bay: *Nunns Hb. Tvl. Mus. 23794* (PRE).
HUMANSDORP. Jeffrey's Bay: *Denman 43* (GRA).
PORT ELIZABETH. Victoria Park Lands: *Long Fl. E. Cape 617.* Thornhill: *de Vos 2209.*
ALICE. Hogsback: *Batten 2-PL62* (NBG).

Flowering period July to September.

Some herbarium specimens of this variety, e.g. *Lewis BOL 24775*, are distinguishable only with difficulty from *R. rosea* var. *reflexa*, on account of the small size of the bracteoles and therefore of their membranous margins. A transverse section through the leaf, or a paradermal section of one of the lateral leaf ribs, usually gives conclusive evidence: in *R. atrandra* a small vascular strand, to be seen in transverse section, is associated with the fibre bundle in each rib margin, and rather short, subepidermal crystals occur opposite the large vascular bundles.

48. **Romulea hallii** De Vos sp. nov.

Fig. 70.

Cormus subglobosus 10—25 mm diam., tunicis rigidis laevibus brunneis, basi in dentibus acuminatis sulcatis, ad unum latus valde curvatis, et apice fibris ca. 5 mm longis fissis. *Caulis* brevis, vaginis foliorum obtectus. *Vaginae basilares* 2. *Folia* plura basilaria compresso-cylindrica patentia, valde recurvata, 10—13 cm longa, 2—3 mm diam., rigida, sulcis angustis vel latis, basibus vaginantibus ad 6 mm latis. *Pedunculi* 30—60 mm longi, ca. 2 mm diam., semiteretes suberecti. *Bractea* ovata concava 15—18 mm longa, parte inferiore subtriangulari viridi, marginibus apiceque membranaceis latis minute brunneo-

punctatis. *Bracteola* concava, parte mediana angusta viridi vel viridula, marginibus apiceque late membranaceis ut in bractea. *Flores* 2—4, 22—32 mm longi. *Tubus perigonii* 5—6 mm longus infundibularis; *segmenta* anguste obovato-cuneata 15—22 mm longa, 8—10 mm lata, subacuta vel subobtusa interdum apiculata, pallide caesia, in dimidio cuisque segmenti macula violacea et infra macula altera atrata, basi et dimidio inferiore segmentorum aurantiacis, linea media atrata e macula extensa; segmenta exteriora a dorso 3—5 nervis violaceis et tenuiter pinnatinervata. *Stamina* erecta, prope basin tubi perigonialis inserta, dimidium vel sub dimidium perigonii attingentia, aurantiaca; *filamenta* 5—6 mm longa, basibus dense pilosa; *antherae* 4—5 mm longae, leviter incurvatae, polline luteo. *Stylus* 10—12 mm longus; *stigmata* caespite apicali papillarum ornata, apices vel sub apices antherarum attingentia. *Capsulae* ellipsoideae, ad 10 mm longae, in pedunculis valde recurvatis vel demum flexuosis.

Holotype: *Hall 3176* in NBG.

Plants 8—13 cm tall. *Corm* subglobose, 10—25 mm diam., tunics hard, smooth, brown, split at the base into acuminate, grooved teeth sharply bent towards one side, and at top into fibres ca. 5 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* 2, 20—60 mm long. *Leaves* several, basal, compressed cylindrical, spreading, strongly recurved, 10—13 cm long, 2—3 mm diam., rigid, grooves narrow or wide, sheathing leaf bases up to 6 mm wide. *Peduncles* 30—60 mm long, ca 2 mm diam., semiterete, suberect. *Bract* ovate, concave, 15—18 mm long, with an almost triangular green lower half, and wide, minutely brown-speckled, membranous margins and tip. *Bracteole* concave, with a narrow, median, green or greenish zone, and wide, membranous margins and tip as in the bract. *Flowers* 2—4, 22—32 mm long. *Perigone tube* 5—6 mm long, funnel-shaped; *segments* narrowly obovate-cuneate, 15—22 mm long, 8—10 mm wide, subacute to subobtuse, sometimes apiculate, pale wistaria-blue (RHS 92D), with a violet, and below that an almost black blotch in the middle of each segment, cup and lower half of segments orange-yellow with a dark median line extending from the blotch; outer segments on the backs with 3—5 violet veins and fine feathered veining. *Stamens* erect, inserted near the base of the perigone tube, reaching halfway or less up the perigone, orange-yellow; *filaments* 5—6 mm long, densely pilose at the bases; *anthers* 4—5 mm long, slightly incurved, pollen golden-yellow. *Style* 10—12 mm long; *stigmas* often with a terminal tuft of longer papillae, reaching the anther tips or just below them. *Capsules* ellipsoid, up to 10 mm long, on strongly recurved, or later flexuose, peduncles. *Chromosome number* 2n = 22 (*de Vos 2215*).

SUTHERLAND. Top of Verlatekloof: *Hall 3176*, *de Vos 2215*. SW of Sutherland: *Stayner* 8.7.1968 (NBG).

Flowering period May to July.

R. hallii has seemingly a very local distribution on clayey ground at the summit of Verlatekloof. It is intermediate between *R. atrandra* and *R. komsbergensis*, with leaves and anthers like those of *R. atrandra*, and bracteole and stigmas similar to those of *R. komsbergensis*. It was at first thought to be a hybrid between the two species. The pollen, however, is 92 per cent apparently viable, and large capsules, with numerous well-developed seeds, are usually produced.

It is further distinguished by a very pale, wistaria-blue perianth with an orange-yellow cup and a violet and a black blotch in the middle of each segment. The bract has an almost triangular green base, and is bordered by wide membranous margins.

49. **Romulea komsbergensis** De Vos, Ann. Univ. Stellenbosch 28A, 3: 69 (1952a).

Icon: ibid. p. 70; this work Fig. 71, 76.

Plant 12—30 cm tall. *Corm* subglobose to subovoid, 7—10 mm diam., the tunics hard, smooth, brown, split into grooved basal teeth bent towards one side, and apical teeth 3—5 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* usually 2, 15—55 mm long. *Leaves* 5 or more, basal, filiform, 12—30 cm long, ca. 1 mm diam., arcuate, occasionally suberect, grooves narrow, the adaxial groove often open up to 30 mm from the leaf tip, sheathing leaf bases 4—6 mm wide. *Peduncles* 40—70 mm long, or rarely shorter, subterete. *Bract* and *bracteole* narrowly ovate, 15—24 mm long, green in the centre especially of the upper half, and often submembranous in the lower half, with 3—4 mm wide, mostly fawn-coloured membranous margins and tips, acute to obtuse, sometimes somewhat lacerated. *Flowers* mostly 3 or more, 20—35 mm long. *Perigone tube* 3—4 mm long, funnel-shaped; *segments* obovate-cuneate, 15—28 mm long, 8—15 mm wide, or sometimes smaller, reflexed in the open flower, obtuse, sometimes subobtuse or minutely apiculate, rosy-magenta (RHS 68A, 68B, 73A), often with blue tips, and with a narrow blue transverse band below the middle, cup buttercup-yellow but brown in its base; outer segments with 5—7 violet longitudinal veins on the backs and fine feathered veining in between, or sometimes reddish-purple or irregularly marked, inner segments slightly shorter and wider than the outer, blue on the backs with bluish-mauve veins. *Stamens* reaching less than halfway up the perigone; *filaments* erect, 4 mm long, often sparsely pilose towards the base; *anthers* 3—5 mm long, violet, later becoming yellow, with tips incurved or later circinnate, pollen brown or rust-coloured. *Style* 5—7 mm long, branches ca. 3 mm long, spreading, attenuate, whitish to violet; *stigmas* with a terminal tuft of longer papillae, and not reaching

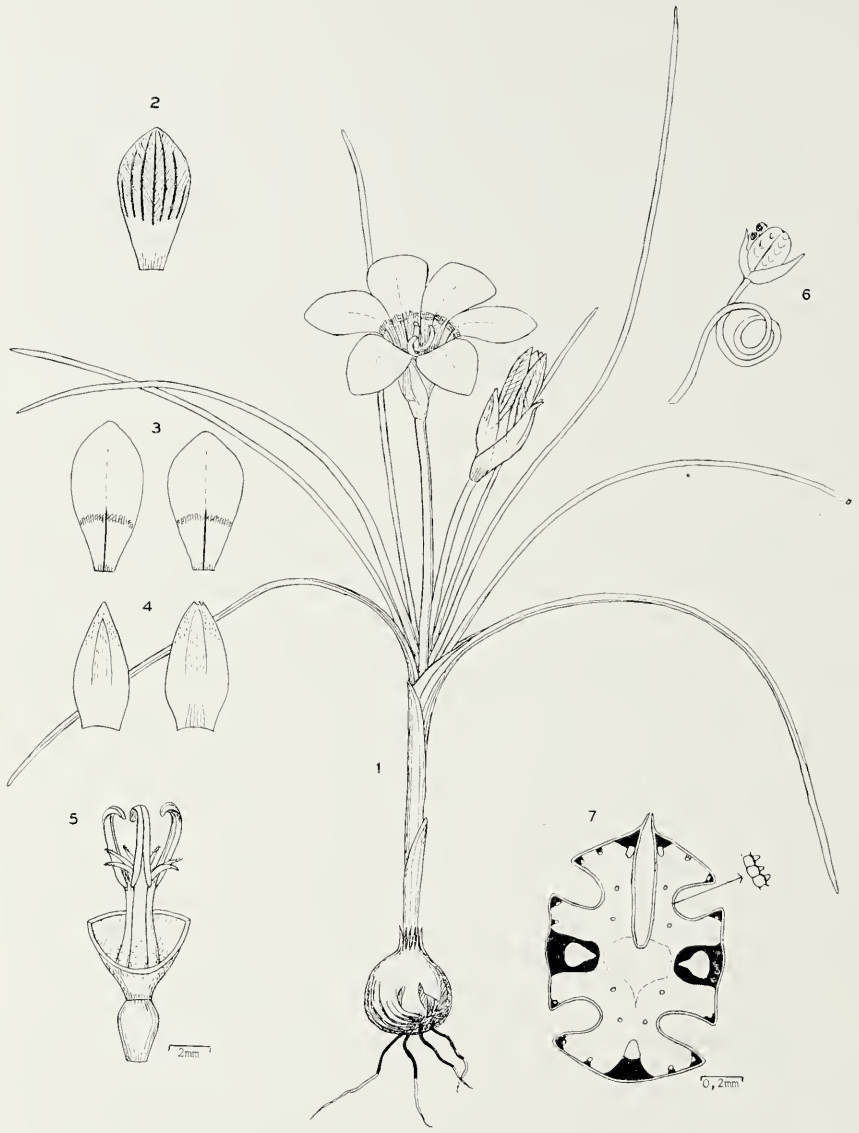


FIG. 71.

R. komsbergensis (*de Vos* no. *1582*). 1, plant $\times \frac{7}{8}$. 2, outer perianth segment, lower surface $\times 1$. 3, outer and inner segments, upper surfaces. 4, bract and bracteole $\times 1$. 5, pistil, stamens, and perianth tube. 6, mature capsule $\times 1$. 7, transverse section of leaf.

the anther tips. *Capsules* 8—10 mm long, obovoid, later on coiled up peduncles. *Chromosome number* 2n = 20 (*de Vos 1932*).

Holotype: *de Vos 1582* in STE.

SUTHERLAND. Groot-Roggeveld, N of Komsberg: *de Vos 1582*. One mile N of the summit of Komsberg Pass: *de Vos 1932*. 23,5 miles SSE of Sutherland: *Leistner 277* (PRE), *Acocks 18451* (BOL, M).

Flowering period August to September.

This species has been found only on the plateau above the Komsberg in sandy soil. It stands near *R. atrandra*, but is readily distinguished by its less rigid, somewhat more membranous bract and bracteole which are sometimes submembranous in the lower half and have wider membranous margins, its incurved or circinnate anthers and spreading attenuate style branches, by the usually obtuse perianth segments with purplish-blue tips, and a cup which is brown in its base below a yellow zone.

Sometimes there is a tendency in this species for one or two of the style branches to split a second time, forming a few more than six short, terminal stigmas. This shows its affinity with *R. multifida*. The two species are, however, distinct, and where they occur together, hybrids were not observed.

50. **Romulea multifida** De Vos, Ann. Univ. Stellenbosch 28A, 3: 71 (1952a).

Icones: ibid. p. 73; this work Fig. 72, 78.

Plants 10—20 cm tall. *Corm* ovoid, 6—8 mm diam., tunics hard, smooth, brown, split into grooved basal fibres bent towards one side, and apical fibres ca. 3 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* 2, 5—40 mm long. *Leaves* 2—3, basal, filiform, curved, 10—20 cm long, 0,5—1 mm diam., with a strong vein in each rib, grooves narrow, sheathing leaf bases 3—5 mm wide. *Peduncles* 30—50 mm long, subterete. *Bract* submembranous with colourless membranous margins and tip, more or less ovate, 14—18 mm long, subacute or subobtuse. *Bracteole* subequal to the bract or slightly longer and wider, with very wide membranous margins which are whitish in lower half and fawn in the upper, tip membranous. *Flowers* 1—2, 22—30 mm long. *Perigone tube* 5—7 mm long, funnel-shaped; *segments* narrowly obovate-cuneate, 14—20 mm long, 6—9 mm wide, minutely apiculate, rosy-magenta (RHS 68A, B), with brown or dark blotches and above them a narrow blue band in the throat, cup yellow, outer segments on the backs with 3—5 violet veins. *Stamens* hardly reaching to the middle of the perigone; *filaments* 5—6 mm long, sparsely pilose near base; *anthers* 2,5—4 mm long, circinnate, purplish or yellowish, pollen yellow. *Style* 6—8 mm long, multifid near top, with branches 3—4 mm long, violet; *stigmas* 12 or more, small, terminal. *Capsules* ca. 8 mm long, on coiled peduncles. *Chromosome number* 2n = 22 (*de Vos 2194*).

Holotype: *Joubert STE 27158* in STE.

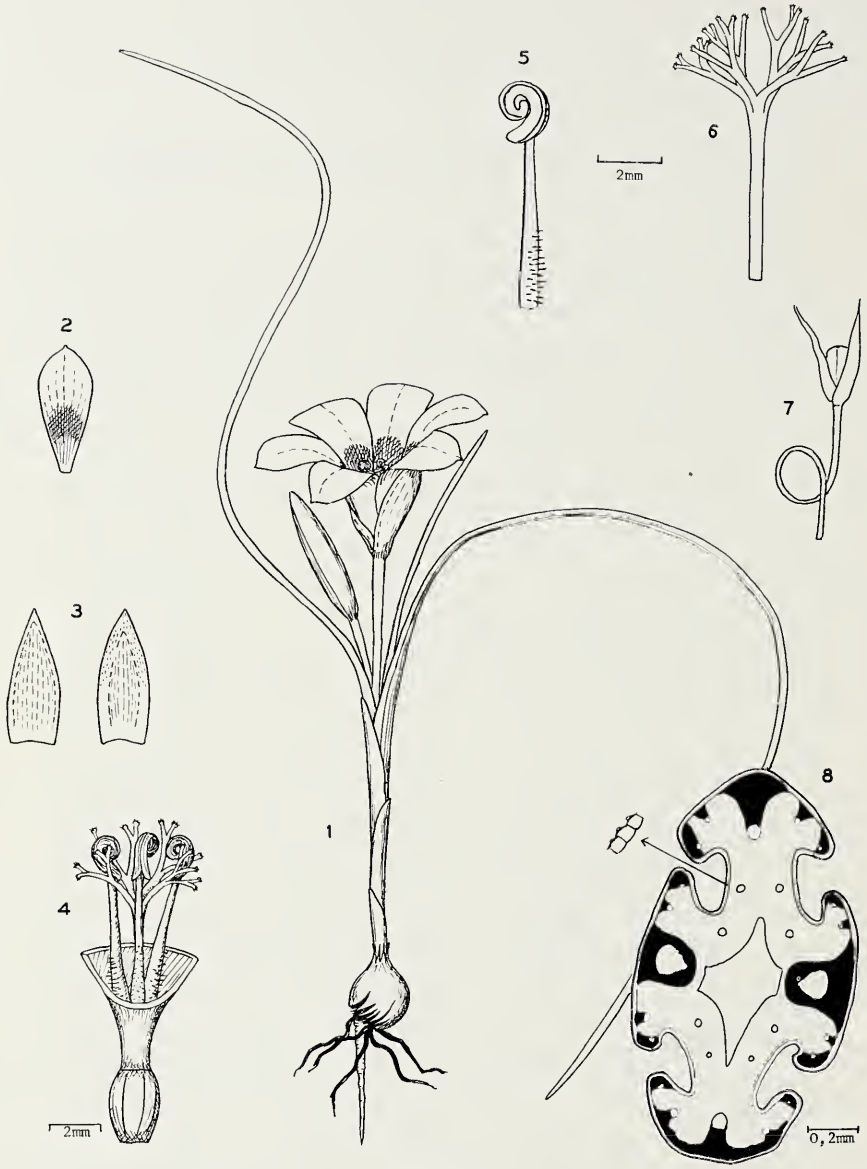


FIG. 72.

R. multifida (*STE 27158*). 1, plant $\times \frac{7}{8}$. 2, perianth segment, upper surface. 3, bract and bracteole $\times 1$. 4, pistil, stamens and perianth tube. 5, stamen. 6, style and stigmas. 7, almost mature capsule $\times 1$. 8, transverse section of leaf.

SUTHERLAND. Jakhalsvallei: *Burchell 1321* (K). West of Sutherland: *Joubert STE 27158*. 11 miles from Verlatekloof top towards Komsberg: *de Vos 2194*.

Flowering period August.

In sandy soil on the Sutherland plateau.

This species has apparently a very local distribution near Sutherland, the three localities where it was found being about ten miles apart. The *Burchell* collection in K was identified in notes on the sheet, as *Trichonema speciosum* Ker and as *Ixia longifolia* Salisb. or a variety of *I. rosea*. Although it has some characters similar to *R. rosea*, notably the pink perianth and similar corm, it can be readily distinguished from the latter, as well as from other *Romulea* species, by its multifid, violet style branches and numerous small, terminal stigmas, its inrolled anthers, and more membranous bract and bracteole.

It stands nearest the sympatric *R. komsbergensis* from which it differs in the above-mentioned characters of style and stigmas, in the more membranous, somewhat transparent bract and bracteole, slightly longer perianth tube, and in the differently coloured cup and yellow pollen, as well as in chromosome number. The leaf has five superficial veins in each rib and *R. komsbergensis* only three.

51. **Romulea malaniae** De Vos sp. nov.

Fig. 73.

Cormus subglobosus 5—8 mm diam., tunicis rigidis laevibus brunneis, basi in dentibus sulcatis ad unum latus curvatis et apice in fibris 2—3 mm longis fissis. *Caulis* brevis vaginis foliorum obtectus. *Vaginae basilares* plerumque 2. *Folia* 1—3 vel aliquando plura basilaria filiformia 12—25 cm longa, ca. 1 mm diam. erecta vel curvata, sulcis angustis, basibus vaginantibus ad 3 mm latis. *Pedunculi* 30—50 mm longi, basin versus semiteretes, apicem versus fere teretes et ad 2 mm diam. dilatati, pallide virides, mox prope apicem geniculascentes. *Bractea* pro parte majore membranacea vel in medio dimidii superioris viridis, anguste triangularis 12—18 mm longa, nervis tenuibus purpurascentibus, marginibus membranaceis interdum basi per ca. 3 mm junctis, apice membranaceo aliquando lacerato. *Bracteola* parum magis membranacea quam bractea, marginibus apiceque latis membranaceis. *Flores* 1—3, 15—32 mm longi. *Tubus perigonii* 5—9 mm longus, in dimidio inferiore angustus, in superiore infundibularis; *segmenta* anguste obovato-cuneata 8—20 mm longa 4—5 mm lata acuta flava, segmenta exteriora a dorso brunnescentia. *Stamina* erecta, ubi tubus perigonii amplificat inserta, flava; *filamenta* 4—5 mm longa, prope basin sparsim pilosa; *antherae* 3—4 mm longae. *Ovarium* flavovirens; *stylus* 8—10 mm longus; *stigmata* acute recurva plerumque sub apices antherarum attingentia. *Capsulae* 5—8 mm longae, saepe sub terram detrusae per pedunculos valde recurvatos demum gyratos.

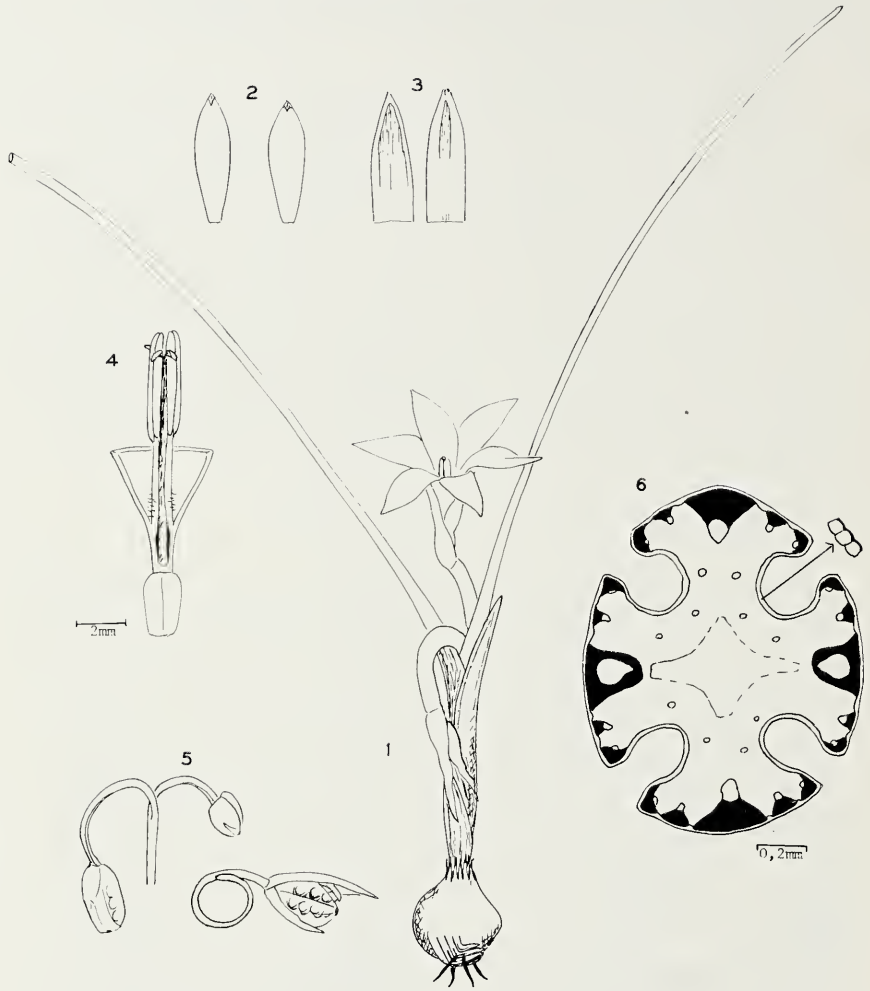


FIG. 73.

R. malaniae (*STE 30312*). 1, plant ×1. 2, outer and inner perianth segments. 3, bract and bracteole ×1. 4, pistil, stamens, and perianth tube. 5, ripening and mature capsules ×1. 6, transverse section of leaf.

Holotype: *Malan STE 30312* in STE.

Plants 12—25 cm tall. *Corm* subglobose 5—8 mm diam., rounded at the base; tunics hard, smooth, brown, split into bent, grooved teeth at the base and apical fibrils 2—3 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* usually 2, 10—60 mm long. *Leaves* 1—3 sometimes more, basal, filiform, 12—25 cm long, ca. 1 mm diam., erect or bent, grooves narrow, sheathing leaf bases to 3 mm wide. *Peduncles* 30—50 mm long, semiterete towards the base, almost terete and widening to 2 mm diam. towards the top, pale green, soon becoming sharply bent near the top. *Bract* largely membranous or green in the centre of the upper half, with membranous margins, narrowly triangular, 12—18 mm long, with slender purplish veins, margins sometimes joined at the base for ca. 3 mm, tip membranous, sometimes lacerated. *Bracteole* somewhat more membranous than the bract, with wide membranous margins and tip. *Flowers* 1—3, 15—32 mm long. *Perigone tube* 5—9 mm long, narrow in the lower half, funnel-shaped in the upper; *segments* narrowly obovate-cuneate, 8—20 mm long, 4—5 mm wide, acute, pale yellow (RHS 11), exterior segments brownish on the backs. *Stamens* erect, inserted where the perigone tube widens, pale yellow; *filaments* 4—5 mm long, sparsely pilose near the base; *anthers* 3—4 mm long. *Ovary* pale yellowish-green; *style* 8—10 mm long; *stigmas* 1—1,5 mm long, ligulate, sharply recurved, mostly below anther tips. *Capsules* 5—8 mm long, often pushed underground by strongly recurved peduncles which coil up when dry. *Chromosome number* 2n = 24 (*STE 30312*).

MONTAGU. Sandvlei, 14 mls. S of Matroosberg Station towards Koo: *Malan STE 30312* In a fairly moist, sandy locality at the foot of a stony ridge.

Flowering period August.

This rare species from the Karoo, found only once in 1967, is readily distinguished by its small, pale yellow flowers on rather stout, pale green peduncles which get an almost knee-like bend near the top even before the flowers fade, its very short stem hidden by the leaf bases, and by its corm with bent, grooved teeth at the base. Its vegetative characteristics including its leaf structure, show its affinity with the Atrandrae; its chromosome number, however, is unusual.

52. **Romulea diversiformis** De Vos Ann. Univ. Stellenbosch 28A: 63 (1952a) et 1965 p. 139.

Icon: Ann. Univ. Stellenbosch l.c. p. 64; this work Fig. 74.

Plants 8—20 cm tall. *Corm* subglobose, 8—15 mm diam., the tunics hard, smooth, brown, split into grooved basal fibres bent towards one side and apical fibres 3—5 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* 1—2, 10—40 mm long or sometimes not evident. *Leaves* 6 or more, basal, filiform, arcuate, flexuose or suberect, 7—20 cm long, 0,5—1,5 mm diam., grooves


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narrow, leaf bases 4—8 mm wide. Peduncles 40—70 mm long, subterete. *Bract* green or greenish, occasionally with purplish veins, with white membranous margins ca. 2 mm wide and a membranous tip, narrowly triangular to narrowly ovate, 13—20 mm long, acute to subacute. *Bracteole* with a narrow greenish median zone and ca. 3 mm wide membranous margins which are sometimes brownish towards the membranous tip. *Flowers* 1 or more, 25—35 mm long, buttercup-yellow (RHS 15 or 17). *Perigone tube* 4—6 mm long, funnel-shaped; *segments* 18—28 mm long, tips reflexed, acute to subacute or sometimes acuminate, outer segments obovate to narrowly obovate, 7—12 mm wide, brownish on the backs, inner segments 10—16 mm wide, obovate-cuneate, sometimes with flexuose margins. *Stamens* reaching about halfway up the perigone, yellow; *filaments* 4,5—6 mm long, erect, pilose at the base; *anthers* 5—7,5 mm long, slightly spreading, with the tips incurved. *Style* 13—17 mm long; *stigmas* 2—3 mm long, 3—6 mm above the anther tips, narrowly ligulate, yellow. *Capsules* 7—10 mm long, ellipsoid or obovoid, on bent peduncles. *Chromosome number* 2n = 20 (*de Vos 1581*).

Holotype: *de Vos 1581* in STE.

SUTHERLAND. Damslaagte, Klein Roggeveld: *de Vos 1581*. Klein Roggeveld: *Joubert STE 27157*. 23 miles N of Matjiesfontein: *de Vos 1929*. 22½ miles SSE of Sutherland, swampy valley: *Acocks 18452* (PRE, K, M), *Leistner 279* (PRE). Geelhoek, seepages at foot of sandstone mt.: *Acocks 17173* (PRE, K).

Flowering period August to September.

This species apparently has a rather local distribution in the area between Sutherland and Matjiesfontein and also west of Sutherland, in moist localities. It differs from many species of Romulea in the absence of dark markings on the bright yellow flowers and in the inner segments being considerably wider than the outer. It has the typical globose corm with grooved basal fibres, the short stem and leaf structure of the Atrandrae. Its bract and bracteole, with their wide membranous margins, and its chromosome number also indicate its affinity with the Atrandrae.

53. **Romulea membranacea** de Vos sp. nov.

Fig. 75.

Cormus oblongus 6—12 mm diam., basi subacutus vel aliquando crista basilari pusilla, tunicis rigidis laevibus brunneis, dentibus acuminatis, aliquanto rectis, ad acumen basilare convergentibus, apice fibris ca. 5 mm longis praedito. *Caulis* brevis vaginis foliorum obtectus. *Vaginae basilares* 1—2. *Folia* plura basilaria filiformia, recurvata vel flexuosa, 8—10 cm longa ca. 0,5 mm diam. glabra vel ciliolata, sulcis angustis, basibus vaginantibus 4—5 mm latis marginibus membranaceis latis praeditis. *Pedunculi* subteretes 30—40 mm longi. *Bractea* membranacea vel aliquando subherbacea in medio dimidii superioris,

FIG. 74.

R. diversiformis (*de Vos* no. *1581*). 1, plant with contractile root, ×¾. 2, outer perianth segment, lower surface. 3, inner segment, lower surface. 4, bract. 5, bracteole. 6, pistil, stamens, and perianth tube ×2,5. 7, stigmas seen from above ×5. 8, transverse section of leaf ×25.

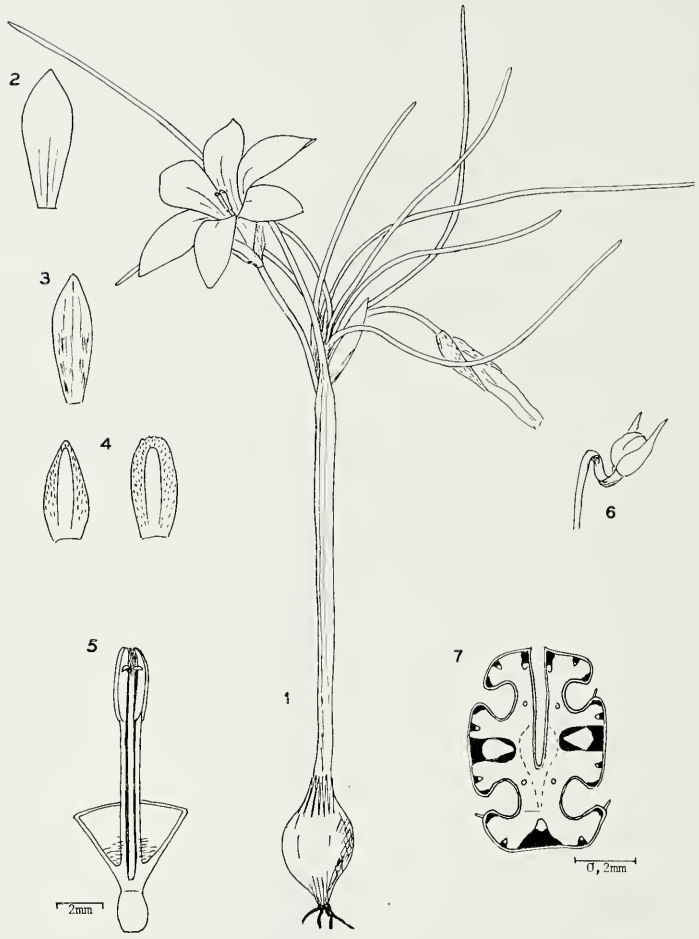


FIG. 75.

R. membranacea (*de Vos* no. *2221*). 1, plant ×1. 2, inner perianth segment. 3, outer segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, mature capsule ×1. 7, transverse section of leaf.

marginibus membranaceis latis brunneo-punctatis, anguste ovata 10—14 mm longa obtusa vel subobtusa. *Bracteola* membranacea marginibus membranaceis latis brunneo-punctatis, subobtusa vel interdum praemorsa. *Flores* 1—3, 20—30 mm longi. *Tubus perigonii* 3—5 mm longus infundibularis; *segmenta* 15—22 mm longa 4—7 mm lata anguste obovata, obtusa vel subacuta, aurea nitentia, 1—3 nervis pertenuibus fuscis, segmenta exteriora a dorso purpureo vel brunneo-maculata et/vel striata. *Stamina* prope basin tubi perigonialis inserta, ca. dimidium perigonii attingentia; *filamenta* 5—6 mm longa, in dimidio inferiore pilosa; *antherae* 3—4 mm longae, saepe apicibus incurvatae. *Stylus* 9—10 mm longus; *stigmata* apices antherarum attingentia. *Capsulae* subglobosae ca. 5 mm diam., in pedunculis valde recurvis.

Holotype: *Salter 3488* in BOL. Isotypes in BM and K.

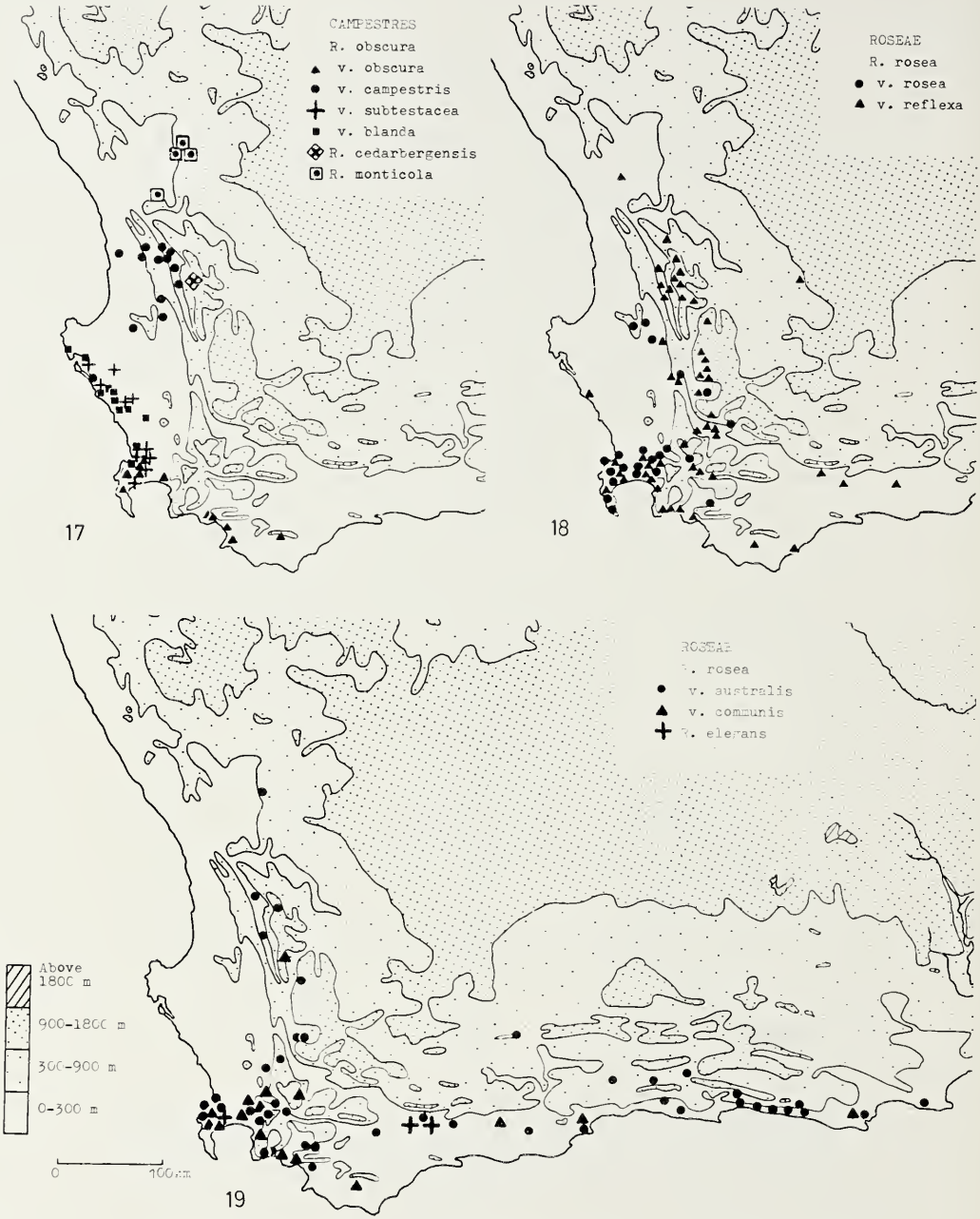
Plants 7—12 cm tall. *Corm* oblong, 6—12 mm diam., pointed at the base or occasionally with a very small basal ridge; tunics hard, smooth, brown, with almost straight, acuminate teeth converging towards the basal point, and apical fibres ca. 5 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* 1 or 2, 20—40 mm long. *Leaves* several, basal, filiform, recurved or flexuose, 8—10 cm long, ca. 0,5 mm diam., glabrous or minutely ciliate, grooves narrow, sheathing leaf bases 4—5 mm wide with wide membranous margins. *Peduncles* subterete, 30—40 mm long. *Bract* membranous or sometimes subherbaceous in the centre of the upper half, with wide brown-speckled membranous margins, narrowly ovate, 10—14 mm long, obtuse or subobtuse. *Bracteole* membranous with wide brown-speckled membranous margins, subobtuse or sometimes irregularly toothed at the tip. *Flowers* 1—3, 20—30 mm long. *Perigone tube* 3—5 mm long, funnel-shaped; *segments* 15—22 mm long, 4—7 mm wide, narrowly obovate, obtuse to subacute, golden-yellow (RHS 12A), shiny, with 1—3 very slender dark veins, outer segments blotched and/or striped on the backs with brown or reddish-purple. *Stamens* inserted near the base of the perigone tube, reaching about halfway up the perigone; *filaments* 5—6 mm long, pilose in the lower half; *anthers* 3—4 mm long, often incurved at the tips. *Style* 9—10 mm long; *stigmas* reaching the anther tips. *Capsules* subglobose, ca. 5 mm diam., on strongly recurved peduncles. *Chromosome number* 2n = ca. 24 (*de Vos 2221*).

CALVINIA. Near Elandsfontein farm, 18 mls. NW of Middelpost: *Salter 3488*, *de Vos 2221*.

Flowering period early August.

On red sandy soil.

This rare species, collected from a single locality only, is readily distinguishable by its corm with a pointed base and almost straight, acuminate basal teeth,



MAPS 17–19.
Geographical distribution: 17, species of subsection *Campestres;* 18, 19 subsection *Roseae*.

its short hidden stem, its very slender, flexuose, recurved leaves, yellow flowers, and bract and bracteole which are largely membranous.

It does not fit readily into any of the sections, but it seems to stand nearest the Atrandrae which has some species with similar bracts. The anatomical structure of the leaf, on the other hand, shows some divergence in an absence of papillae, short subepidermal crystals, and small vascular strands in the rib margins. The corm is also not typical of the Atrandrae.

5.3 Subsection Campestres De Vos subsect. nov.

Cormus basi rotundatus, tunicis basi in dentibus acuminatis, plerumque insulcatis, ad unum latus curvatis fissis. *Folia* ca. 1 mm diam., sulcis angustis. *Pedunculi* e basi curvati patentissimi flexuosi sub capsulis siccis maturis, raro suberecti (*R. monticola*). *Bractea* viridula marginibus membranaceis perangustis. *Bracteola* marginibus latioribus. *Flores* magni ad parvos, rosei vel armeniaci vel lutei vel aurantiaci, interdum maculis in fauce.

Type species: *R. obscura* Klatt.

Corm rounded at the base; tunics split into acuminate, mostly ungrooved, bent, basal teeth. *Leaves* ca. 1 mm diam., with narrow grooves. *Peduncles* bent from the base and widely patent and flexuose below the dry, mature capsules, or sometimes suberect (*R. monticola*). *Bract* greenish with narrow membranous margins. *Bracteole* with wider margins. *Flowers* large to small, old rose, apricot, yellow, or orange-yellow, sometimes with blotches in the throat.

Leaf anatomy. Rib margins without a small vascular strand against the fibre bundles. Epidermis in the grooves papillose or without papillae. Short crystals absent; styloids scattered and subepidermal in the ends of the U-shaped parenchymatic bundle sheaths.

This subsection consists of a large aggregate species, *R. obscura*, occurring on flats at low altitude, and two rare species found on mountain plateaux in the Calvinia and Clanwilliam districts. As far as is known at present, they have chromosome numbers of $2n = 22$. In this they differ from subsection *Roseae*.

54. **Romulea obscura** Klatt, Abh. nat. Ges. Halle 15: 399 (1882).

Plants 10—50 cm tall. *Corm* subglobose, 5—15 mm diam., tunics hard, smooth, brown, with strong, basal teeth bent towards one side, and apical fibres 2—5 mm long. *Stem* short or sometimes elongating to 80 mm, usually hidden by the leaf bases. *Basal sheaths* 1—3, 10—100 mm long. *Leaves* several, usually all basal or sometimes 1—2 basal and the rest cauline, filiform, erect or curved, 10—50 cm long, 0,5—1 mm diam., grooves narrow, sheathing leaf bases 3—12 mm wide. *Peduncles* 5—15 cm long, or rarely shorter or longer, semiterete, erect or curved. *Bract* green or brownish-green, often with very













FIG. 76.
R. komsbergensis. $\times \frac{7}{8}$.

FIG. 77.
R. eximia $\times 1$.

FIG. 78.
R. multifida. $\times \frac{7}{8}$.

FIG. 79.
R. sabulosa. $\times \frac{7}{8}$.

FIG. 80.
R. viridibracteata. $\times \frac{7}{8}$.

FIG. 81.
R. monadelpha. $\times \frac{7}{8}$.

narrow membranous margins, 8—22 mm long, more or less narrowly triangular, with closely-spaced, slender veins, obtuse or acute. *Bracteole* green, with wide, brown or brown-streaked or sometimes colourless membranous margins. *Flowers* 2—4 or more, 15—50 mm long. *Perigone tube* 2—5 mm long, funnel-shaped; *segments* narrowly elliptical or narrowly obovate, 10—40 mm long, 3—12 mm wide, acute to subobtuse, apricot, yellow, rosy-pink or dark old-rose, sometimes with dark blotches in the throat, cup greenish-yellow to orange-yellow, outer segments on the backs irregularly marked or with longitudinal stripes or sometimes brownish-purple. *Stamens* erect, inserted near the base of the perigone tube, reaching halfway or less than halfway up the perigone, yellow; *filaments* 3—8 mm long, minutely pilose near the base or sometimes glabrescent; *anthers* 3—9 mm long. *Style* 6—15 mm long. *Capsules* shortly cylindrical, up to 10—15 mm long, on flexuose peduncles which become bent from their bases and widely patent. *Chromosome number* $2n = 22$ (*de Vos 1746*, *1691*, *1928*, *1901*, *1952*, *2041*).

Type: The holotype, *Drège 4041*, stated to be in the Lübeck herbarium in B, was probably destroyed in the last war. The isotype, *Drège 4041* in S, with Klatt's handwriting on it, is selected as lectotype. Another isotype in BM. (Klatt's note on the sheet in S, "antheris stigmate aequantibus", differs from his description of the species (1882); the former is, however, the more usual condition.)

Flowering period August to September, sometimes to November.

Mostly on sandy or loamy flats at low altitude.

R. obscura, as now constituted, is a large, polymorphic species with a number of varieties and forms connected by intermediates. There is a possibility that two or more of these groups might be distinct species between which introgression has been taking place. But as they seem to run into one another, and as all are interfertile, producing semifertile or almost completely fertile F_1 and F_2 plants, they have been included in a single, large aggregate species.

All its varieties have a chromosome number of $2n = 22$, and in this the species differs from the *R. rosea* complex. *R. obscura* also differs in flower colours which vary from yellow to deep old-rose in which blue is absent (except for bluish or purplish blotches which are sometimes present), and in the peduncles of the ripe capsules which bend from their bases and become widely patent and flexuose. In their corms and corm tunics, bracts and brateoles, and in leaf anatomy, these two polymorphic species are similar. Some herbarium specimens, without ripe capsules and with faded flowers, are unfortunately unidentifiable, e.g. *Dod 564* in BM, from Simonstown, and *Leipoldt 4445* in BOL, from Worcester, which may be either of these two species.

The *R. obscura* complex is distinguished from *R. monticola* by its broader,

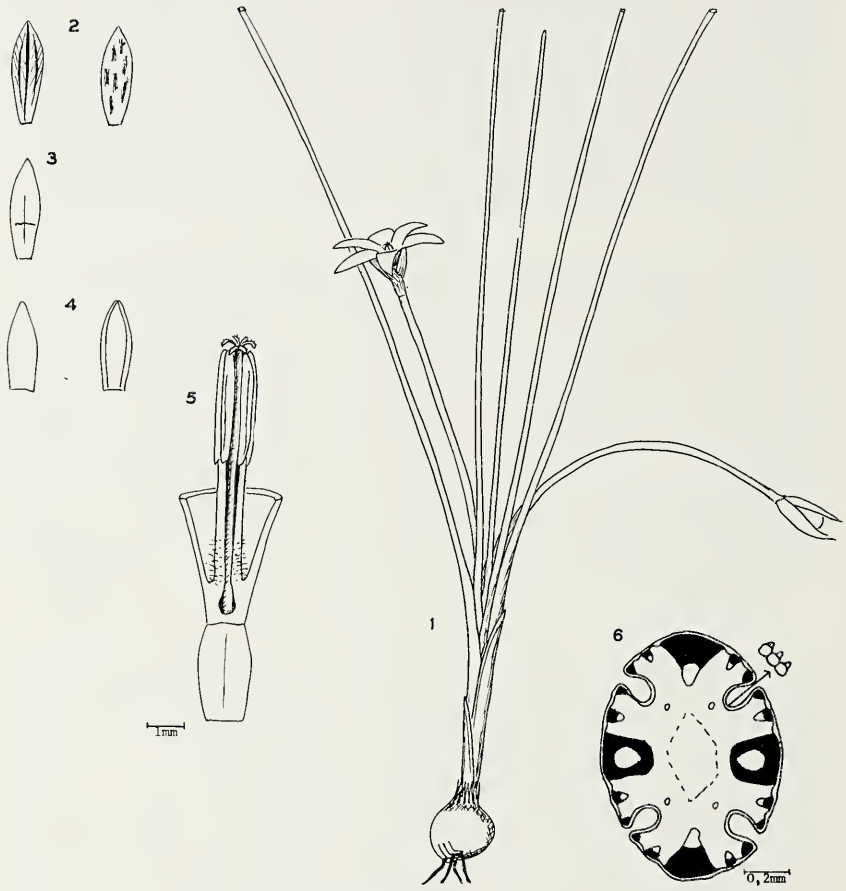


FIG. 82.

R. obscura var. *obscura* (*de Vos* no. *1470*, *1832*). 1, plant $\times \frac{7}{8}$. 2, outer perianth segments, lower surfaces, of two plants $\times 1{,}5$. 3, outer segment, upper surface. 4, bract and bracteole $\times 1$. 5, pistil, stamens, and perianth tube. 6, transverse section of leaf.

semiterete peduncles which become widely patent from their bases in ripe fruiting specimens, and in leaf anatomy: in each lateral rib the sclerenchyma of the large vein and the two smaller veins is confluent in the latter species.

KEY TO THE VARIETIES

1 Perigone yellow or apricot or rarely pale rosy-pink, with slender dark lines in the throat, or rarely with dark blotches and the flowers then yellow.
 2 Flowers 15—25 mm long, rarely to 35 mm; perigone segments narrowly obovate; anthers 3—5 mm long; style 6—10 mm long a. Var. *obscura*
 2 Flowers 25—45 mm long, rarely with dark blotches in the throat and the flowers then yellow; perigone segments usually narrowly elliptical; anthers 7—9 mm long; style 8—15 mm long b. Var. *campestris*
1 Perigone deep rosy-pink or dark old-rose or almost terracotta, generally with blotches in the throat.
 3 Flowers 18—25 mm long or rarely slightly longer; perigone segments 4—7 mm wide, with small purplish-blue or greyish-blue blotches in the throat; style less than 10 mm long. c. Var. *subtestacea*
 3 Flowers 30—50 mm long or sometimes only 25 mm; perigone segments 7—12 mm wide, with dark blotches frequently encircled by violet-blue or grey zones in the throat; style 10—15 mm long d. Var. *blanda*

a. Var. **obscura.**

R. obscura Klatt 1882 p. 399 et 1895 p. 165; Baker 1892 p. 102 pro syn. et 1896 p. 40 pro syn.: Béguinot 1909 p. 78 pro syn.; de Vos 1965 p. 139.

R. parviflora Ecklon 1827 p. 19 in herb. pro parte, nom. nud.: non (Salisb.) Britten 1914. *Trichonema parviflorum* Steudel 1841 p. 702 nom. nud. pro parte. *R. elegans* Klatt var. *parviflora* auct. non Bkr.: Lewis 1950 p. 223.

Fig. 82.

Stem short, hidden by leaf bases. *Leaves* basal, leaf bases 3—5 mm wide. *Flowers* 15—25 or rarely to 35 mm long. *Perigone segments* narrowly obovate, 10—25 mm long, 3—5 mm wide or rarely up to 10 mm wide, acute to subobtuse, yellow or apricot (RHS 35C, 37B, 12A, 13A, 24D), sometimes with 1—3 dark veins on each segment in the throat. *Filaments* 3—5 mm long, minutely pilose near the bases or glabrescent; *anthers* 3—5 mm long. *Style* 6—10 mm long; *stigmas* rather short, at or just below the anther tips.

HOPEFIELD. Near Hopefield: *Malan STE 30203*. Between Koperfontein and Hopefield: *Lewis 3566* (SAM).

MALMESBURY. Between Darling and Ysterfontein: *de Vos 2084*.

BELLVILLE. Kraaifontein: *de Vos 1900, 2245*.

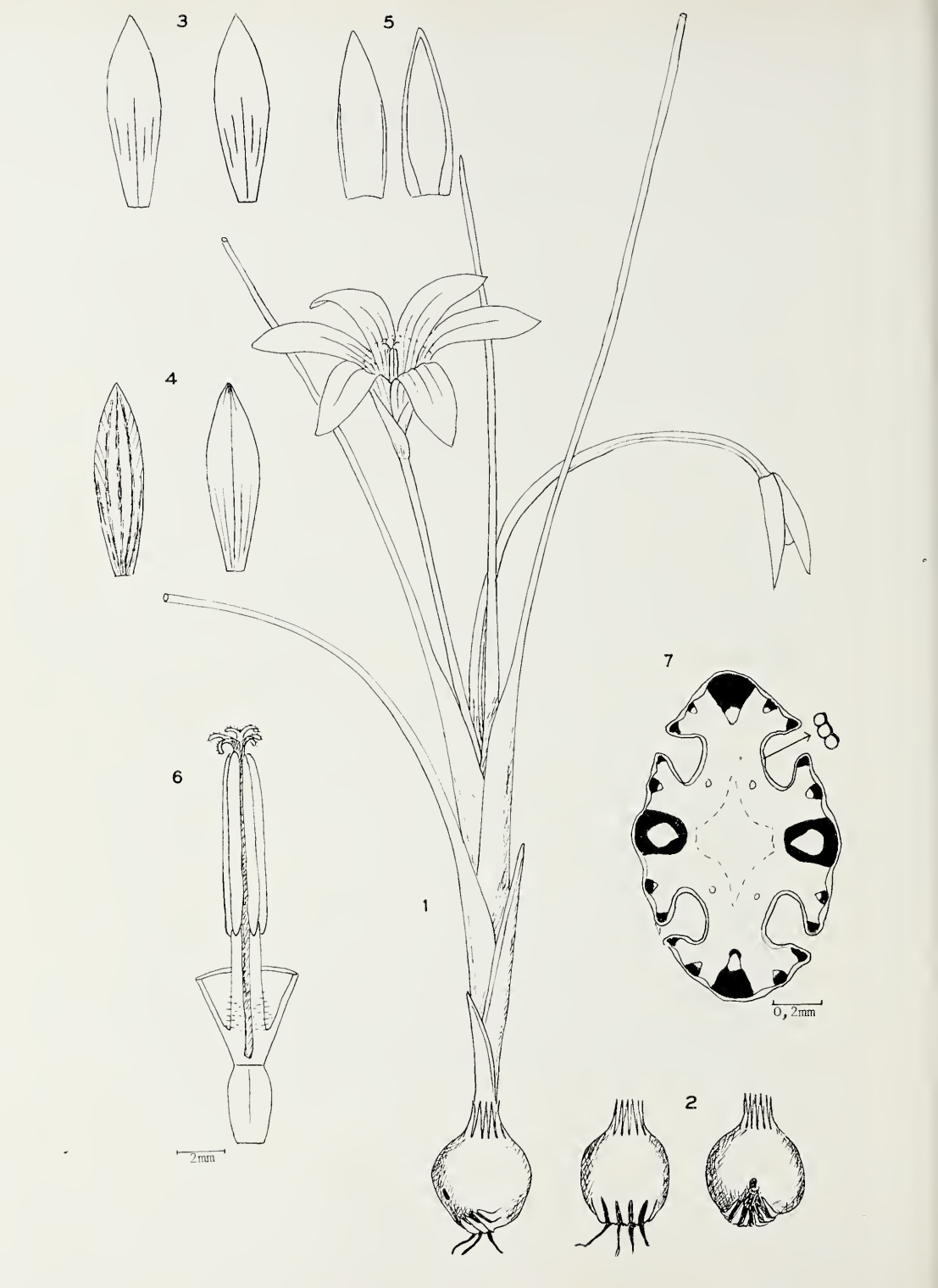
CAPE. Camp Ground: *Bolus 4601* (BM, K), *Zeyher 5030* (GRA). Cape near seaside at . . . ?: sub *T. bulbocodioides Zeyher* coll. non Eckl., et *R. similis* Eckl. (B). Kenilworth: *L. Bolus 13942*. Cape Flats: *Arbuthnot BOL 24778*. Flats E of Klipfontein: *Gillett 1038* (BOL). Flats near Kenilworth: *de Vos 1586*. Wynberg flats between Ottery Rd. and Plumstead: *Dod 1589* (BOL, K), *Dod 3275* (BOL, BM, K). Chapman's Bay: *Dod 1672* (BM, K). Vishoek flats: *de Vos 1832*.

STRAND. Between Somerset West and Strand: *de Vos 1470*. Strand: *de Vos 1746*.

CALEDON, HERMANUS. Near Stanford: *de Vos 2050*. Witvoetkloof road: *de Vos 2135*. Hermanus—Stanford road: *de Vos 2143*.

BREDASDORP. Brandfontein: *Esterhuysen 19004* (BOL). Strandkloof: *Compton 21962* (NBG).

WITHOUT LOCALITY. *Drège 4041* (BM, S).


3
5
4
6
7
1
2
2mm
0, 2mm

Var. *obscura* can be distinguished from the other varieties by its smaller, yellow or apricot-coloured flowers. Some collections from the Hermanus, Stanford, and Bredasdorp areas (*de Vos 2135*, 2143, *Compton 21962*), and one from the Cape Peninsula (*L. Bolus 13941*), have larger yellow flowers which can hardly be distinguished from var. *campestris* in a dried state. As some of these collections consist of specimens with large and small flowers, and as their perianth segments are proportionally wider than in var. *campestris*, they are placed with var. *obscura*.

The leaf of var. *obscura* differs from that of the other varieties in the possession of papillose epidermal cells in the grooves.

At Kraaifontein in the Bellville area, where both var. *obscura* and var. *subtestacea* occur, considerable numbers of intermediates between the two varieties are to be found e.g. *de Vos 2240*, *2243*, some with 100 per cent seemingly fertile pollen and others with up to 50 per cent of the pollen obviously abortive.

R. obscura var. *obscura* is distinguished from the small-flowered *R. rosea* var. *australis* by its narrower, frequently more erect leaves, and apricot-coloured or yellow flowers. Indifferent herbarium specimens, however, can be confused.

Klatt mistakenly recorded the flower colour as "obscure violaceis". He probably saw only the outsides of the flowers which, in herbarium specimens, sometimes appear to be vaguely violet. This is probably the reason why Baker (1892, 1896), as well as Béguinot (1909), identified *R. obscura* with Ecklon's *R. similis*, which the latter described as having "blaulichweise Blumen". But a specimen in S, which is probably Ecklon's type of *R. similis*, is not the same species as the two extant isotypes of *R. obscura*.

Yellow-flowered specimens of *R. obscura* have been misidentified as *R. cuprea* Bkr. in some herbaria.

b. Var. **campestris** De Vos var. nov.

Fig. 65, 83.

A typica caulo interdum parum elongato, basibus vaginantibus foliorum ad 12 mm latis, floribus majoribus, 25—45 mm longis, segmentis perigonii plerumque anguste ellipticis 5—10 mm latis, antheris 7—9 mm longis, stylo 8—15 mm longo, stigmatibus pertenuibus subulatis, distinguitur.

Holotype: *de Vos 1897* in STE.

Stem short or elongating to 80 mm, more or less hidden by leaf bases. *Leaves* all basal or some cauline, with leaf bases up to 12 mm wide. *Flowers* 25—45 mm long. *Perigone segments* generally narrowly elliptical 20—38 mm long, 5—10 mm wide, acute to almost acuminate, varying in colour from yellow

FIG. 83.

R. obscura var. *campestris* (*de Vos* no. *1897*). 1, plant ×1. 2, corm seen from different sides. 3, outer and inner perianth segments, upper surfaces. 4, outer and inner segments, lower surface. 5, bract and bracteole ×1. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf.

to apricot or pale rosy-pink (RHS 18A, B, 19B, 24B, 31C, D, 36A—C, 38B), rarely with dark blotches in the throat, cup golden-yellow with slender dark lines, inner segments often slightly shorter than the outer, with greyish-brown tips and slender brown median lines on the backs. *Filaments* 4—6 mm long, minutely pilose in the lower half or glabrescent; *anthers* 7—9 mm long. *Style* 8—15 mm long; *stigmas* very slender, subulate, grooved, reaching up to or higher than the anther tips.

CLANWILLIAM. Kransvlei Kloof: *Barker 4764* (NBG). 5 mls. from Clanwilliam on road to Kransvlei: *Gillett 4028* (BOL, PRE, US). Near Clanwilliam: *Salter 3680* (BOL). Between Elandskloof and Clanwilliam: *Leipoldt BOL 20951, SAM 54097.* Kloof near Clanwilliam: *Lewis 1851* (SAM). Between Graafwater and Clanwilliam: *de Vos 1897.* South of Graafwater: *de Vos 2005.* Between Clanwilliam and Citrusdal: *de Vos 1898.* Near Leipoldtville: *de Vos 1901.* Paleisheuwel: *Taylor 5948* partly (PRE, STE). Knolvlei: *Taylor 5938* (PRE).

PIKETBERG. Between Eendekuil and Het Kruis: *de Vos 1952.* Near Sauer: *Steyn 544* (NBG).

HOPEFIELD. Along road to Geelbek: *de Vos 2041.* 1 ml. S of Geelbek: *de Vos 2237.*

MALMESBURY. Road to Geelbek: *Lewis 5238* (NBG).

Compton 21962 from Bredasdorp (NBG) cannot be separated from var. *campestris* in its dried state—see under var. *obscura.*

This variety is usually readily distinguished by its large, yellow or apricot or pale rosy-pink flowers, with narrowly elliptical perianth segments, mostly without blotches in the throat, and with the segment width and flower length generally in the proportion of about one to five. It usually has very wide leaf sheaths and the stem is sometimes somewhat elongated and partially visible. Near Geelbek in the Hopefield area a form occurs with slightly wider, bright yellow perianth segments which sometimes have dark blotches in the throat.

Semifertile F_1 hybrids between var. *obscura* and var. *campestris*, as well as between the latter and var. *blanda*, have been obtained experimentally, with 50—70 per cent of obviously abortive pollen. Notwithstanding this high percentage of abortive pollen, fertile seeds were obtained after cross pollination amongst the *blanda-campestris* hybrids, from which fertile F_2 plants were produced in different shades of pink and apricot, some with, and others without blotches in the throat.

In some herbaria yellow-flowered specimens of var. *campestris* have been misidentified as *R. cuprea* Bkr., or as *R. rubrolutea* Bkr.

c. Var. **subtestacea** De Vos var. nov.

Varietas floribus parvis, 18—25 mm longis, segmentis perigonii 4—7 mm latis perroseis vel subtestaceis, in fauce maculis purpureo-caeruleis vel griseo-caeruleis notatis, antheris 2—5 mm longis, stylo 7—9 mm longo, distinguitur.

Holotype: *de Vos 2037* in STE.

Stem short or to 30 mm long, hidden by leaf bases. *Leaves* mostly basal, with leaf bases 3—6 mm wide. *Flowers* 18—25 mm long or rarely slightly longer. *Perigone segments* narrowly obovate, 12—20 mm long, 4—7 mm wide, acute,

dark old-rose or often almost terracotta (RHS 39B), with small purplish-blue or greyish-blue blotches in the throat from which slender dark median lines run downwards into a greenish-yellow cup. *Filaments* 4—5 mm long, pilose at the bases; *anthers* 2—5 mm long. *Style* 7—9 mm long; *stigmas* reaching the anther tips.

HOPEFIELD. Near Langebaan: *Salter 3003* (BOL). Near Hopefield: *Lewis 1057* (SAM).
MALMESBURY. Soutpan NE of Ysterfontein: *de Vos 2037*. Between Darling and Mamre: *L. Bolus 21263*. Melkbosstrand road: *de Vos 1887*.
BELLVILLE. Kraaifontein: *de Vos 1899*.
CAPE. *Rogers 16964* (GRA). Milnerton: *Wall* 10/37 (S). Cape Town: *Hutton* ann. 1893 (GRA). Rondevlei: *L. Bolus 22897*. Cape Flats: *Arbuthnot* BOL *20310* (BOL, K). Paarden Island: *Salter 8260* (BOL, SAM).
Wilms 3721 from Green Point, Cape (P), is probably this variety.

This variety stands intermediate between var. *obscura* and var. *blanda*. The flowers have the colouring of var. *blanda*, except that the blotches in the throat are not encircled by a bluish or greyish area, and they are small, as in var. *obscura*. Epidermal papillae are absent in the grooves of the leaves. Large numbers of intermediates between var. *subtestacea* and var. *obscura* occur in the Kraaifontein area.

d. Var. **blanda** De Vos var. nov.

Fig. 64, 84.

A typica floribus majoribus, 30—50 mm longis, segmentis perigonii 7—12 mm latis, perroseis, in fauce maculis atrorubris vel atropurpureis notatis plerumque caeruleo-ocellatis vel griseo-ocellatis, antheris 5—8 mm longis, stylo 10—15 mm longo, distinguitur.

Holotype: *L. Bolus 20725* in BOL. Isotype in K.

Stem short or to 30 mm long, hidden by leaf bases. *Leaves* mostly basal, with leaf bases 4—6 mm wide. *Flowers* 30—50 mm long, rarely only 25 mm. *Perigone segments* narrowly obovate, 20—40 mm long, 7—12 mm wide, deep rosy-pink or dark old-rose (RHS 48B, C, 52C), acute to subacute, with dark red dark purple blotches in the throat which are frequently encircled by violet-blue or grey zones, cup orange or golden-yellow with a slender dark median line from each segment. *Filaments* 4—8 mm long, pilose at the bases and sometimes up to the middle; *anthers* 5—8 mm long. *Style* 10—15 mm long; stigmas generally at the anther tips.

VREDENBURG. Near Danger Bay: *de Vos 1928*.
HOPEFIELD. Near Langebaan: *Salter 3007* partly (K). Policeman's Kop, Donkergat road: *Barker 10394* (NBG).
MALMESBURY. Between Mamre and Ysterfontein: *L. Bolus 20725*. Near Ysterfontein: *Salter 1344* partly (BOL, BM, K). South of Darling: *de Vos 1691*. Weylands, Darling: *de Vos 2085*. Near Mamre: *L. Bolus 21262* partly. 3 mls. E of Mamre Road station: *Salter 6865* partly (BOL). Along road to Melkbosch: *Lewis 1062* (SAM), *Compton 13452* (NBG). Darling Flora

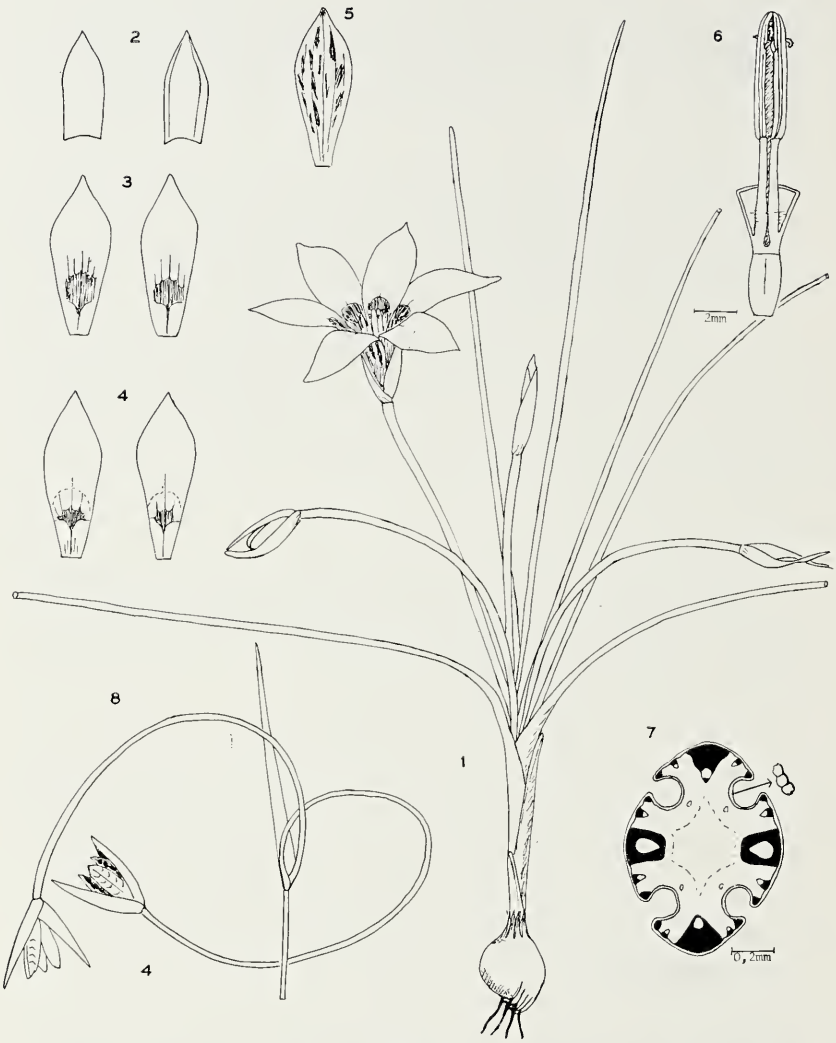


FIG. 84.

R. obscura var. *blanda* (*de Vos* no. *1691*). 1, plant $\times \frac{3}{4}$. 2, bract and bracteole $\times 1$. 3, 4, outer and inner perianth segments, upper surfaces, of two plants $\times 1$. 5, outer segment, lower surface. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf. 8, mature capsules $\times 1$.

Reserve: *Lewis 5535* (NBG). On Darling road: *Acocks 2153* partly (S). Between Malmesbury and Kalabaskraal: *L. Bolus 24785. Macowan HNAA 525* (GRA) from near Groenkloof is probably this variety.

CAPE. Paarden Island: *Compton 13708* (NBG). Rugby: *Adamson 2609* (SAM). Claremont: *Schlechter 1569* (GRA).

Var. *blanda* is closely related to var. *subtestacea* and differs in its larger flowers which, in the Darling area, usually have the blotches in the throat encircled by violet-blue or grey zones.

Herbarium specimens from the Darling area can be mistaken for the sympatric and almost similarly coloured *R. eximia. Bolus 21262*, for example, consists of both species. The two taxa can, however, be readily distinguished by their corms, the markings in the throat of the perianth (to be seen in the living state), and the more orange-yellow cup of var. *blanda*; they also differ in the curvature of the flexuose, dried peduncles of var. *blanda*, the anatomical structure of the leaves, and in their chromosome numbers.

Near Darling var. *blanda* can be confused with *R. hirsuta* which also has old-rose flowers. Their corms are totally different.

55. **Romulea monticola** De Vos sp. nov.

Fig. 85.

Cormus subglobosus 5—15 mm diam., tunicis rigidis laevibus brunneis, fibris basalibus ad unum latus acute curvatis et saepe ad flexum effractis, apice fibris 3—10 mm longis praedito. *Caulis* brevis vaginis foliorum obtectus. *Vaginae basilares* plerumque 2. *Folia* 3 vel plura basilaria filiformia, 9—25 cm longa, ad 1 mm diam., curvata vel suberecta, aliquando ciliolata in marginibus porcarum, sulcis angustis, basibus vaginantibus 5—6 mm latis. *Pedunculi* 25—80 mm longi vel aliquando longiores, subteretes tenues rubiginosi. *Bractea* subviridis vel e brunneo purpurea, submembranacea, marginibus membranaceis brunneis, fere anguste triangularis 10—12 mm longa, nervis approximatis, acuta vel subacuta vel aliquando emarginata. *Bracteola* marginibus membranaceis latis brunneis, apice membranaceo. *Flores* 2—4 vel plures 22—35 mm longi. *Tubus perigonii* 3—4 mm longus infundibularis; *segmenta* anguste elliptica vel anguste obovata 18—27 mm longa 5—7 mm lata acuta vel subobtusa aurea, plerumque basi crocea, in fauce nervis fuscis 1 vel pluribus, segmenta exteriora a dorso e rubro brunnea vel 3—5 vittata. *Stamina* erecta prope basin perigonii inserta, plerumque non dimidium perigonii attingentia lutea; *filamenta* 4—5 mm longa, minute pilosa in dimidio inferiore; *antherae* 3—5 mm longae, primo apicibus conjunctae. *Stylus* 7—10 mm longus; *stigmata* apices antherarum attingentia vel paulo inferiora. *Capsulae* breviter ellipsoideae ad 10 mm longae, in pedunculis suberectis vel curvatis.

Holotype: *de Vos 1924* in STE.

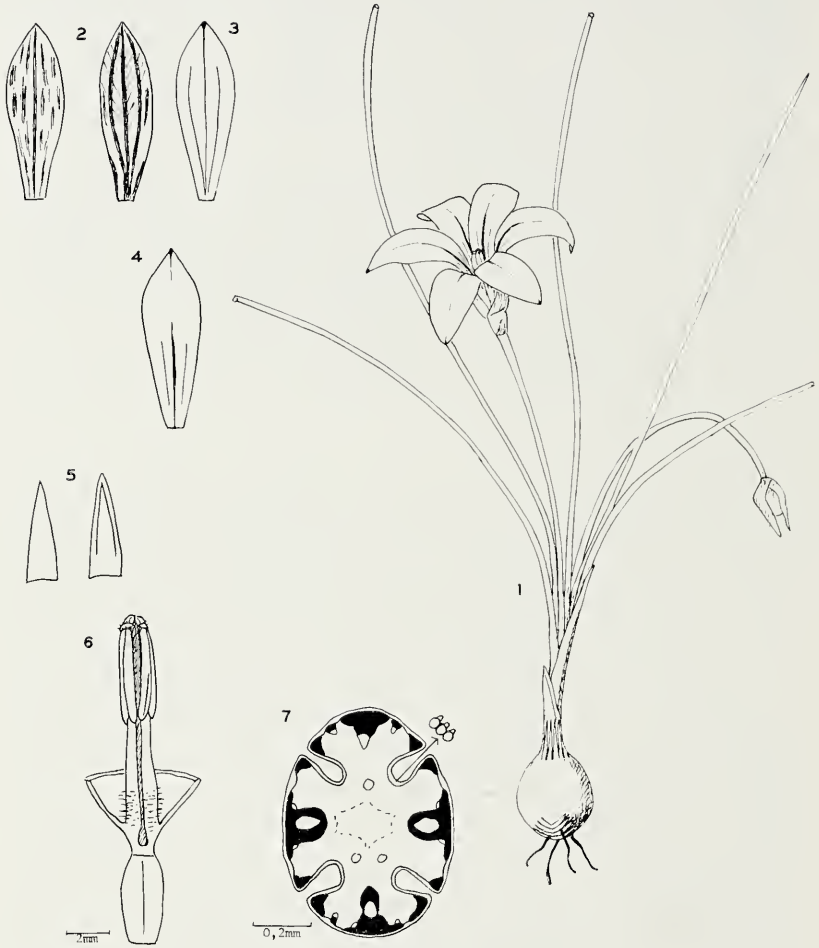


FIG. 85.

R. monticola (*de Vos* no. *1924*.) 1, plant ×1. 2, outer perianth segments, lower surfaces, of two plants ×1. 3, 4, inner segments, upper surface. 5, bract and bracteole ×1. 6, pistil, stamens, and perianth tube. 7, transverse section of leaf.

Plants 10—25 cm tall. *Corm* subglobose 5—15 mm diam.; tunics hard, smooth, brown, with strong basal fibres sharply bent towards one side and often broken off on the bend, and apical fibres 3—10 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* usually 2, 10—80 mm long. *Leaves* 3 or more, basal, filiform, 9—25 cm long, up to 1 mm diam., curved or suberect, sometimes minutely ciliate on the rib margins, grooves narrow, sheathing leaf bases 5—6 mm wide. *Peduncles* 25—80 mm long or sometimes longer, subterete, slender, reddish-brown. *Bract* greenish or brownish-purple and submembranous, with brown, membranous margins, more or less narrowly triangular, 10—12 mm long, with closely spaced veins, acute or subacute or sometimes emarginate. *Bracteole* with wide, brown, membranous margins and membranous tip. *Flowers* 2—4 or more, 22—35 mm long. *Perigone tube* 3—4 mm long, funnel-shaped; *segments* narrowly elliptical to narrowly obovate, 18—27 mm long, 5—7 mm wide, acute to subobtuse, golden-yellow, frequently with a darker yellow cup and 1 or more dark veins in the throat, outer segments reddish-brown on the backs or with 3—5 dark longitudinal veins. *Stamens* erect, usually reaching less than halfway up the perigone, yellow; *filaments* 4—5 mm long, minutely pilose in the lower half; *anthers* 3—5 mm long, at first joined at tips. *Style* 7—10 mm long; *stigmas* reaching the anther tips or slightly lower. *Capsules* shortly ellipsoid, up to 10 mm long, on suberect or curved peduncles. *Chromosome number* 2n = 22 (*de Vos 1924*).

CALVINIA. Summit of VanRhyns Pass: *Buhr NBG 1471/37*, *Bond 1194* (NBG), *Lewis & Davis SAM 61061*, *de Vos 1924*, *Esterhuysen 5274* (BOL). Eastern outskirts of Nieuwoudtville: *Acocks 18212* (PRE). Between Grasberg and Nieuwoudtville: *Lewis 5844* (NBG), *de Vos 2023*. Oorlogskloof: *Compton 20883* (NBG). 4 mls. E of Nieuwoudtville: *Jordaan 1263* (STE).
VANRHYNSDORP. Matsikamma plateau: *Uys STE 30201*.

Flowering period June to September.

On sandy or loamy soil on the plateaux of the Bokkeveldberge and Gifberg.

This species is readily recognisable by its corm, brown subterete peduncle, yellow flowers with dark veins in the throat, and submembranous bract. It is closely allied to *R. obscura* from which it differs in its subterete peduncles which remain suberect or bend only slightly in fruiting specimens, and in its always buttercup-yellow flowers; its stamens and stigmas do not reach halfway up the perianth, and the membranous margins of its bracteoles are slightly browner than in *R. obscura*. The two species have the same chromosome number and anatomically the leaves are almost similar, except that in *R. monticola* there is a tendency for the sclerenchymatic sheaths of the lateral vascular bundles to coalesce.

R. monticola and *R. montana*, which occur together on the plateau above VanRhyns Pass, have flowers similar in form and colour. The two species are, however, not closely allied and can readily be distinguished by their corms and

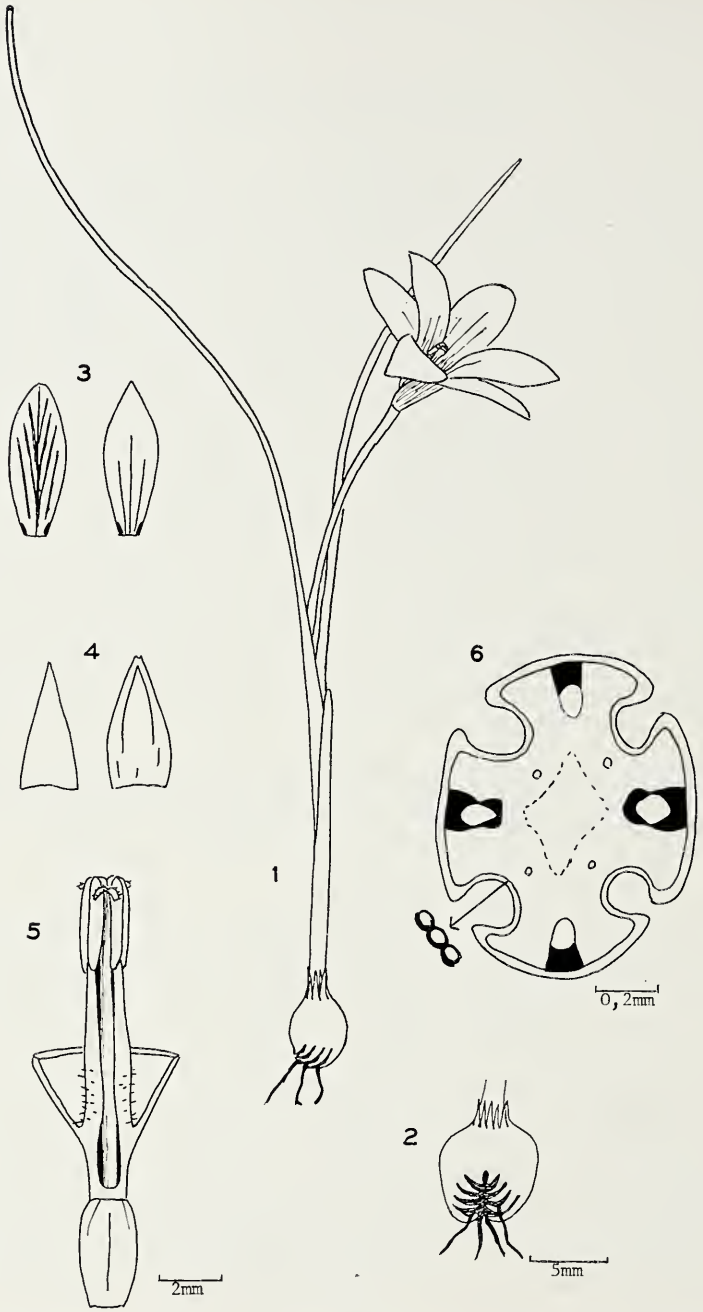


FIG. 86.

R. cedarbergensis (*de Vos* no. *2030*). 1, plant ×1. 2, corm seen from opposite side. 3, outer and inner perianth segments, lower surfaces. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, transverse section of leaf.

by the less green bract of *R. monticola*. They also differ in chromosome numbers and leaf structure.

R. monticola has been erroneously identified as *R. cuprea* Bkr. in some South African herbaria.

56. **Romulea cedarbergensis** De Vos sp. nov.

Fig. 86.

Cormus subglobosus 3—6 mm diam., tunicis rigidis laevibus brunneis, fibris basalibus insulcatis ad unum latus curvatis, apice fibris 3—4 mm longis praedito. *Caulis* perbrevis, vaginis foliorum obtectus. *Vaginae basilares* 1—2. *Folia* 1—3, basilaria 3—18 cm longa 0,3—0,5 mm diam. filiformia, erecta vel leviter curvata, sulcis perangustis aegre manifestis, basibus vaginantibus 2 mm latis. *Pedunculus* 10—50 mm longus, ad 1 mm diam., teres suberectus atropurpureus. *Bractea* submembranacea purpurea vel viridis, fere anguste triangularis 6—15 mm longa, marginibus membranaceis perangustis incoloratis, nervis pertenuibus, acuta. *Bracteola* atropurpurea in parte media, marginibus membranaceis latis brunneolis vel brunneo-punctatis vel brunneo-marginatis. *Flos* 1 (vel aliquando 2) 15—25 mm longus. *Tubus perigonii* 3—5 mm longus infundibularis, angustus in dimidio inferiore; *segmenta* anguste obovata, 7—16 mm longa, 2,5—6 mm lata, obtusa vel subobtusa, alba vel subrosea, basi aurea, segmenta exteriora a dorso lavendulaceo-vittata. *Stamina* erecta, prope basin perigonii inserta, dimidium perigonii attingentia vel paulo altiora; *filamenta* 4—6 mm longa, minute pilosa in dimidio inferiore, aurantiaca; *antherae* 2—3,5 mm longae luteolae. *Stylus* 7—9 mm longus, stigmatibus apices antherarum attingentibus vel paulo superantibus. *Capsula* obovoidea ca. 8 mm longa, in pedunculo suberecto.

Holotype: *de Vos 2030* in STE.

Plants 3,5—18 cm tall. *Corm* subglobose, 3—6 mm diam., tunics hard, smooth, brown, with ungrooved basal teeth bent towards one side, and apical fibres 3—4 mm long. *Stem* very short, hidden by the leaf bases. *Basal sheaths* 1—2, 7—35 mm long. *Leaves* 1—3, basal, filiform, 3—18 cm long, 0,3—0,5 mm diam., erect or slightly bent, with very narrow, hardly visible grooves, and sheathing leaf bases 2 mm wide. *Peduncle* 10—50 mm long, up to 1 mm diam., terete, suberect, purplish-red. *Bract* submembranous, dark purplish-red or green, more or less narrowly triangular, 6—15 mm long, with very narrow, colourless membranous margins and very slender veins, acute. *Bracteole* purplish-red in the central part, with wide, fawn or brown-speckled or brown-edged membranous margins. *Flower* 1, sometimes 2, 15—25 mm long. *Perigone tube* 3—5 mm long, funnel-shaped, narrow in the lower half; *segments* narrowly obovate, 7—16 mm long 2,5—6 mm wide, obtuse to subobtuse, white or pale

pink, with a golden-yellow cup, the outer segments striped on the backs with purplish-blue. *Stamens* erect, reaching halfway up the perigone or slightly higher, inserted near the base of the perigone; *filaments* 4—6 mm long, minutely pilose in the lower half, orange-yellow; *anthers* 2—3,5 mm long, pale yellow. *Style* 7—9 mm long: *stigmas* at or just above the anther tips. *Capsule* obovoid, ca. 8 mm long, on suberect peduncles.

CLANWILLIAM. Cedarberg, Krakadouwsberg, rocky basin: *Esterhuysen 8043* (BOL). Donkerkloof, Cedarberg: *Stokoe SAM 63691.* Wolfsberg above cleft: *de Vos 2030.*

This rare species, found in shallow hollows on three of the high mountain plateaux of the Cedarberg range, at altitudes of ca. 1 500 m, may perhaps be more widely distributed on those mountains.

It has the typical short stem and rounded corm, with bent, basal teeth, of subsections Roseae and Campestres. It differs in the possession of fewer leaves and flowers, in its semi-membranous, often purplish bract and bracteole, the latter with wider membranous margins, and in its filaments which are longer than the anthers. The leaf structure is a reduced roseae type, with a single vascular bundle in each rib, hardly any fibres in the rib margins, and sometimes without papillae in the grooves. Its chromosome number seems to be more than 18, and for this reason it is placed with the subsection *Campestres* rather than with subsection *Roseae.*

5.4 Subsection Roseae

Corm rounded at the base; tunics split into bent, acuminate, mostly ungrooved, basal teeth. *Leaves* 0,5—2,5 mm diam., with narrow grooves. *Peduncles* becoming arcuate after flowering and straightening on drying. *Bract* and *bracteole* as in subsection Campestres. *Flowers* large to small, magenta, pink, lilac-pink or white, sometimes with dark blotches or a differently coloured zone in the throat.

Type species: *R. rosea* (L.) Eckl.

Leaf anatomy. Rib margins without a small vascular strand against the fibre bundles. Epidermis in the grooves generally papillose. Short crystals absent; styloids scattered and usually also subepidermal in the ends of the U-shaped parenchymatic bundle sheaths.

Only one species is placed with this subsection. *R. rosea* is a large, polymorphic species with a wide range of distribution and with a number of varieties which were formerly regarded as distinct species.

57. **Romulea rosea** (L.) Eckl. Top. Verz. p. 19 (1827).

Plants 15—60 cm tall. *Corm* subglobose, 5—15 mm diam., tunics smooth, brown, splitting into acuminate apical teeth 3—6 mm long and usually acuminate

basal teeth bent towards one side. *Stem* usually short, hidden by the sheathing leaf bases. *Basal sheaths* 1—2, up to 60 mm long. *Leaves* several, basal, filiform to compressed cylindrical, 0,5—2,5 mm diam., sheathing leaf bases 4—8 mm wide. *Peduncles* 5—18 cm long, semiterete, suberect. *Bract* greenish or purplish, often with very narrow, hardly visible, membranous margins, 12—25 mm long narrowly triangular, acute. *Bracteole* with wide, brown or brown-streaked, membranous margins. *Flowers* several, 15—48 mm long. *Perigone tube* 2—8 mm long, funnel-shaped; *segments* narrowly obovate, 10—38 mm long, 3—10 mm wide, acute to subacute, magenta, pink, lilac-pink, or white, cup pale yellow to orange-yellow, often with a violet-blue zone in the throat, exterior segments on the backs variously coloured or marked. *Stamens* erect, 7—16 mm long; *filaments* inserted near the base of the perigone tube, slightly pilose in the lower half, not widened at the bases; *anthers* 3—10 mm long, pale to golden-yellow, usually subequal to longer than the filaments. *Style* 7—18 mm long; *stigmas* below, above or at the anther tips. *Capsules* shortly cylindrical or ellipsoid, 10—15 mm long, on peduncles which elongate slightly and curve after flowering, but straighten when the ripe capsules dry out; dehiscence shortly after drying out. *Chromosome number* 2n = 18 (*de Vos 1755*, *1753*, *1741*, *1953*, *1966*, *2004*, *1093*, *1104*, *1096*, *1977*, *Duthie 1244*).

Type. Linnaeus (1767) based his description of *Ixia rosea* on Miller's figure (Ic. t. 240 (1760)), which shows a plant with flowers which are pink inside, blue in the throat, bluish outside, and have yellow cups. No herbarium specimen of Miller's has been found. In the BM, sub *Ixia rosea* Hort. Kew 1778, there is a specimen consisting of a dissected flower with an elongated style, and several leaves, which might be Aiton's type (1789) of *I. rosea*. But it is unlikely that this is the plant described and figured by Miller in 1760. A Burman specimen in the Geneva herbarium, labelled *Crocus capensis* Burman, also has Miller's descriptive polynomial name on it. It resembles the latter's figure to some extent, but it is a "compound" specimen, consisting of several leaves and two flowers belonging to different varieties of *R. rosea*. As it is unlikely that this is the specimen figured by Miller, his figure is regarded as the holotype. The figure is not very good, and is even misleading in that the flowers are rather small, and all the perianth segments are coloured bluish on the reverse.

R. rosea is a large polymorphic species with a number of varieties and forms, often connected by intermediates. All have a diploid chromosome number of 18, a corm rounded at the base with tunics splitting into bent teeth, a short stem, peduncles which usually bend after flowering and become suberect when the mature capsules dry out, greenish or reddish bracts, bracteoles with brown or brown-streaked membranous margins, flowers ranging in colour from magenta to white with yellow cups, and often a purplish-blue zone or blotches in the throat, and erect stamens.

R. rosea differs from *R. obscura* in chromosome number, in the pink colour of its flowers being more towards the magenta and lilac shades, in its short, hidden stem which usually does not elongate, or elongates only very slightly after flowering, and in the peduncles of the ripe capsules which straighten and become suberect on drying.

Baker (1896) had no clear idea of *R. rosea* and included under the species several varieties with pink flowers (or what appeared to be pink in herbarium specimens) and with elongated stems. The latter feature does not belong to *R. rosea*. He recognised var. *pudica*, *speciosa*, *dichotoma*, and *parviflora*. Béguinot (1909) showed that Baker's varieties belonged to several species, with the exception of the typical variety and possibly of var. *parviflora*. On the other hand, Béguinot recognised seven varieties of *R. rosea*. Two of these, var. *flavescens* and var. *cuprea*, belong to different species and are synonyms of *R. montana* and *R. hirsuta* respectively. His var. *chloroleuca* is a white form of the typical variety and has now been included with var. *rosea*. Var. *parviflora*, notwithstanding redefinition by Béguinot, remains dubious (see under var. *australis*).

Béguinot's var. *reflexa* and var. *elegans* are retained, and two varieties which he placed with *R. cruciata* are transferred to *R. rosea* under var. *australis*, which is an earlier epithet. A new variety is now described, as there remains a small group of specimens which is distinct from any of the other varieties.

Key to the Varieties

1 Flowers white with a golden-yellow cup often drying to orange-yellow; outer segments reddish on the backs, irregularly blotched or with a pale median line . e. Var. *elegans*
1 Flowers magenta to pink or white; if white then cup pale yellow and outer segments yellowish or greenish on the backs.
2 Stigmas usually overtopping the anthers; corm slightly compressed globose, outer tunics somewhat membranous, not very hard, split irregularly at the base or into teeth bent towards one side a. Var. *rosea*
2 Stigmas usually at or below the anther tips; corm subglobose, outer tunics usually hard and rigid, split at the base into teeth bent towards one side.
3 Widest leaves 0,5—1 mm diam., subterete; outer perigone segments on the backs with 3—5 longitudinal violet veins and fine feathered veining in between, or irregularly blotched, or purple and sometimes with pale median zones . . . b. Var. *reflexa*
3 Widest leaves often 1 mm or more in diam., somewhat compressed cylindrical; outer perigone segments on the backs yellowish-green, sometimes with 3 or 5 dark longitudinal lines and flowers then usually small.
4 Flowers generally less than 23 mm long, sometimes up to 25 mm; perigone segments up to 4 mm wide; outer segments with 3—5 longitudinal stripes on the backs or yellowish-green c. Var. *australis*
4 Flowers generally longer than 23 mm; perigone segments 4—8 mm wide; outer segments usually yellowish-green on the backs, rarely striped . . d. Var. *communis*

a. Var. **rosea.**

R. rosea (L.) Ecklon 1827 p. 19; Baker 1877 p. 88 et 1892 p. 103 excl. var., et 1896 p. 41 excl. var.; Klatt 1882 p. 400 et 1895 p. 166 excl. syn. Hornem &

R. vulgaris Eckl.; Béguinot 1907b p. 102 et p. 471 pro parte et 1909 p. 60 excl. syn. eadem et var. 3—7; Lewis 1950 p. 222 excl. var.

Bulbocodium sp. Miller 1760 p. 160 et t.240. *B. chloroleucum* (Jacq.) Kuntze 1891 p. 700. *B. roseum* (Eckl.) Kuntze 1891 p. 701.

Crocus capensis Burman f. 1768 p. 2 pro parte excl. var. floribus luteis—type: *Burman* s.n. (G holo).

Ixia rosea L. 1767 p. 75 et 1770 p. 75—type: Miller t.240; Aiton 1789 p. 56—type: sub. *I. rosea* Hort. Kew. 1778 (BM holo); Willdenow 1797 p. 196; Persoon 1805 p. 46; Vahl 1806 p. 49 excl. syn. *I. campanulata*; Roemer & Schultes 1817 p. 375 excl. syn. Lam. & Red. & De la R.; Steudel 1821 p. 454 excl. syn. Lam. & De la R. *I. bulbocodium* Murray 1774 p. 75 pro parte; Lamarck 1789 p. 335 var. δ; Thunberg 1783 p. 6 et 1823 p. 55 var. γ. *I. chloroleuca* Jacquin 1790 p. 180—type: Ic. 2 t.272; Willdenow 1797 p. 196; Persoon 1805 p. 46; Roemer & Schultes 1817 p. 373. *I. ochroleuca* Vahl 1806 p. 50—type: Jacquin Ic. 2 t.272; Poiret 1813 p. 200 var α.

Trichonema ochroleucum Ker 1805 p. 223; Sprengel 1825 p. 149; Klatt 1865–66 p. 670. *T. roseum* Ker 1809 t.1225 et 1827 p. 81 pro parte, excl. aliquot syn.; Sprengel 1825 p. 149 excl. syn.; Steudel 1841 p. 702 excl. syn. Burm. & Lam.; Klatt 1865–66 p. 663 excl. omnes syn. *T. chloroleucum* Ker 1827 p. 82.

Romulea rosea omnes var. Planchon 1852–53 t.799. *R. rosea* var *chloroleuca* (Jacq.) Beg. 1909 p. 62. *R. chloroleuca* Baker 1877 p. 89 et 1892 p. 102 et 1896 p. 39; Klatt 1882 p. 398 et 1895 p. 163. *R. celsii* (Planchon) Klatt 1882 p. 400 et 1895 p. 163.

Icones: Miller 1760 t.240. Jacquin 1786–93 t.272. Ker 1809 t.1225. Dietrich 1831 t.6. Planchon 1852–53 t.799. This work Fig. 87.

Corm subglobose, often somewhat depressed, outer tunics usually somewhat membranous, splitting irregularly or into a row of rather membranous, narrow, bent teeth at the base. *Leaves* ca 1 mm diam., subterete, suberect, each rib with a prominent vein, grooves narrow. *Peduncles* 5—15 cm long. *Flowers* 22—35 mm long or sometimes up to 45 mm. *Perigone tube* 4—5 mm long, sometimes up to 8 mm; *segments* 6—10 mm wide, acute or subacute, magenta, deep rosy-pink to pale pink or white, sometimes with a violet-blue zone in the throat, cup yellow, outer segments on the backs green, greenish-mauve or blotched. *Stamens* 9—16 mm long, golden-yellow, reaching lower than halfway, or higher, up the perigone. *Style* 12—18 mm long; stigmas usually overtopping the anthers by several millimetres.

PIKETBERG. Top of Piketberg: *Pillans 7397* (K). Hills N of Mouton's Vlei: *Pillans 7397* (BOL). Near Porterville: *Ross-Frames BOL 24772, 24779.*

CERES. *Meebold 14831* (M).

TULBAGH. Wintershoek: *Pappe SAM 20692.*

WORCESTER. Boesmansvlei, Botha's Halt: *Pica Survey 5, 722* (PRE).

CAPE. Around Cape Town: *Castelnau 548* (PRE, P). Table Mountain: *Ecklon 702* (PRE, G, K, M, P, S, Z). Monte Diabole: *Rehmann 935* (Z). Rocky shore near Sea Point:

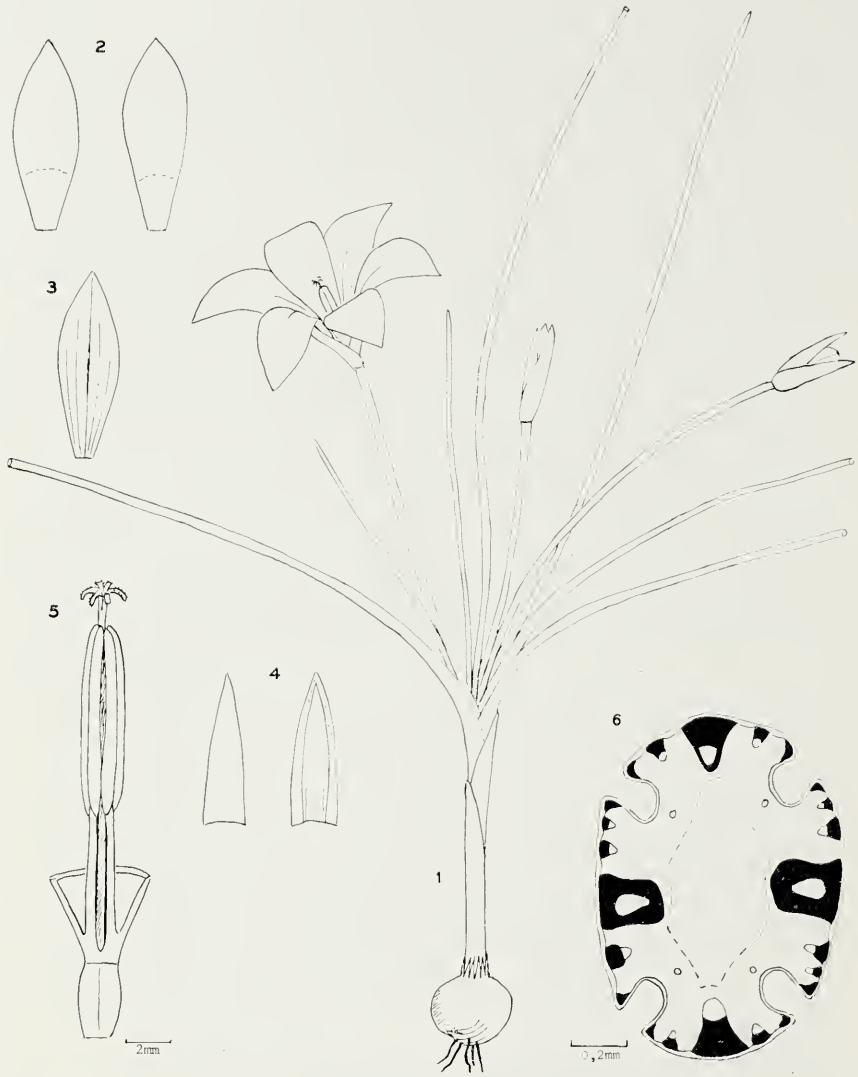


FIG. 87.

R. rosea var. *rosea* (*de Vos* no. *1755*). 1, plant ×1. 2, outer and inner perianth segments, upper surfaces. 3, outer segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, transverse section of leaf.

Dod 2969 partly (K). Pipe Track near Woody Buttress: *Schmidt 283* (M). Cape Flats: *Zeyher 424* (GRA), *1603* (GRA, SAM, G, K, P), *Schlechter 4* (G, P, Z). Camp Ground: *Dod 3614* (BOL, BM, K), *Dod 3613* (BOL). Flats E of Rondebosch: *Burchell 169* (K). Kirstenbosch: *Carter* Nov. 1926 (BOL). Sherwood, Kenilworth: *L. Bolus BOL 13729*. Roadside to Tokai: *Dod 2102* (BOL, BM, K). Muizenberg: *Wall* s.n. (LD, S). Near Sirkelsvlei: *Salter 1853* (BOL, BM, K). Between Witsand and Simonstown: *Gutlrie* Dec. 1927 (BOL). Mts. near Simonstown: *Pillans BOL 18789*. Smitswinkel Bay: *Olafstrom* s.n. (S). Southern Peninsula: *Lewis SAM 54303*. Cape Point: *Wall* s.n. (S). Dieprivier: *Marloth 7252* (PRE). Buffels Bay: *Compton 5972* (NBG). Klaver Valley: *Compton 5270* (BOL, NBG).

WELLINGTON. Bainskloof: *Schlechter 9124* (BOL, GRA, PRE, BM, G, K, US, Z), *Leipoldt* Oct. 1928 (BOL).

PAARL. Groot Drakenstein: *Rogers 17924* (Z). Bergrivier bei Paarl: *Drège* sub *Trichonema chloroleucum Ker a* (S). E end of Franschhoek pass: *Hafström & Acocks 2079* (PRE). 1 ml. beyond Fisantekraal: *Mathews* s.n. (BOL).

STELLENBOSCH. Stellenbosch Flats: *Garside 283* (K), *Low STE 1318a*. Moddergat: *de Vos 1755*. Jonkershoek: *Garside 92* (K), *Kerfoot 6011*. Banhoek: *L. Bolus BOL 19151*. Beside Bottelary Rd.: *Acocks 971* (S). Faure: *Acocks* 3673 (S).

SOMERSET WEST—STRAND. *Rogers 17666* (GRA, NU, Z). Firgrove: *Olafstrom* s.n. (S), *Wall* (LD). Van der Stel: *Smith 4695* (PRE).

CALEDON. Swartberg near Baths: *Ecklon & Zeyher 196* (G), sub *Romulea fragrans* Eckl. Franschhoek Pass: *Acocks 2079* (S). Between Franschhoek Pass and Sonder Einde River bridge: *Salter 4954* (BM, K), *Salter 4955* (BOL, K), *Barker 174* (BOL).

WITHOUT LOCALITY. *Burman* sub *Crocus capensis* Burm. partly (G). Hb. de *Ventenat* s.n. (G). *Leibold* ann. 1838 (G). *Drège* sub *Trichonema chloroleucum* Ker (G). *Zeyher 1605* partly (SAM). *Zeyher 1603* (K, P).

Specimens excluded: The following collections, cited by Baker (1896) under *R. rosea*, belong to different species most of which were described after 1896: *Bolus 6620* (*R. namaquensis*); *Bolus 2239* (*R. atrandra*); *Evans 373* (*R. campanuloides*); *MacOwan 246* (R. *autumnalis*). *Werdermann & Oberdieck 120* in B, photograph in PRE, has an elongated stem and is not *R. rosea*.

The typical variety has in its populations a large proportion of plants with stigmas overtopping the anthers. In this it resembles Miller's description and figure (1760) and differs from the other varieties.

White-flowered specimens of this variety were described as *R. chloroleuca*. Many populations, however, consist of pink-flowered and white-flowered specimens, with intermediate pale pink shades, which are all completely interfertile.

b. Var. **reflexa** (Eckl.) Beg. Annu. Conserv. Jard. bot. Genève 11–12: 158 (1908a) et 1909 p. 64.

R. reflexa sensu Ecklon 1827 p. 18 excl. syn.—only syntype seen: *Ecklon* Sept. 10.26 (S). *R. cruciata* sensu Ecklon 1827 p. 19 excl. syn.: non Baker 1877, nec Klatt 1895, nec Béguinot 1907a nec 1909, nec Lewis 1950. *R. rosea* sensu Ecklon 1827 p. 19 in herb. *R. rosea* var. *speciosa* Baker 1892 p. 103 pro parte et 1896 p. 42 in herb. pro parte: non Lewis 1950. *R. muirii* N. E. Brown 1932 p. 467—type: *Muir 4848* (K holo!).

Crocus capensis Burm. f. 1768 p. 2 excl. var. floribus luteis.

Trichonema reflexum Steudel 1840 p. 702 excl. syn. Thunb.

Icon: Marloth 1915 Pl. 43 Fig. C is possibly this variety but the leaves are drawn too wide; Veld & Flora 1: 40, 41 (1971).

Corm usually with hard, dark brown outer tunics and bent teeth at the base which sometimes break at the bend. *Leaves* up to 1 mm diam., subterete, suberect or sometimes spreading, each rib with a prominent vein, grooves narrow. *Peduncles* 3—12 cm long. *Flowers* 25—38 mm long, sometimes only 20 mm. *Perigone tube* 3—5 mm long; *segments* 6—10 mm wide or sometimes only 4 mm, acute, magenta to pinkish-lilac (RHS 72B, C, 73D, 74A, B, C, D), sometimes white, with an orange or bright yellow cup, often with a violet-blue zone in the throat, outer segments on the backs often with 3—5 dark longitudinal veins and fine feathered veining, or greenish-red, irregularly blotched or with one or 3 paler longitudinal lines. *Stamens* 7—12 mm long, golden-yellow, reaching less than halfway up the perigone. *Style* 7—14 mm long; *stigmas* usually not overtopping the anthers.

Lectotype: Ecklon (1827) gave a brief diagnosis of *R. reflexa* in the "Topographisches Verzeichnis", and cited three collections, only one of which I was able to find. It is labelled Löwenberge u. Grünpoint, Sept. 10.26, in S, and is selected as lectotype. (Another Ecklon collection of *R. reflexa*, *U.J.701*, has a different locality label and date (Mont Löwenschwanz, Aug.), not mentioned in the Top. Verz. This is therefore possibly not part of Ecklon's original material on which he based the name.)

VANRHYNSDORP. Olifants River valley: *Leipoldt* Aug. 1941 (BOL).

CLANWILLIAM. Between Pakhuis and Wupperthal: *L. Bolus BOL 22451*. Pakhuis Mts.: *Esterhuysen 21754*. Eikeboom, top of Uitkyk Pass: *Leighton BOL 24768*. Uitkyk Pass: *Barker 261* (NBG). 2 mls. from top of Uitkyk Pass: *Gillett 4105* (BOL, NBG). Krakadouwsberg: *Esterhuysen 8042* (BOL). Olifants River valley: *Pearson, P. Sladen Mem. Exp. 7082* (BOL, K). Citrusdal: *Lewis* Sept. 1936 (BOL). Warm Baths: *Leipoldt* Oct. 1931 (BOL). Near Citrusdal, to Elandskloof: *Compton 2013/36*, *Leighton 1249* (BOL, PRE). Upper slopes of Middelberg: *Hafström & Acocks 327* (PRE partly, S). Between Elandskloof and Clanwilliam: *Leipoldt 4422* (BOL). Elandskloof: *Lewis 1348* (SAM), *de Vos 1953*. Waterfall River, Citrusdal: *Barker 3773* (NBG). Cedarberg: *Stokoe SAM 63693*.

SUTHERLAND. Geelhoek: *Acocks 17172* (PRE).

PIKETBERG. Near Porterville: *de Vos 2004*.

CERES. *Olafstrom* s.n. (S). Cold Bokkeveld: *Lewis 2667* (SAM), *Acocks 2220* (S). De Keur: *Esterhuysen 13002* (BOL). Eselsfontein: *Esterhuysen 20369a* (BOL). Gydouw: *Leipoldt 3830* (BOL), *Leighton BOL 24769*. Lakenvlei: *Barker 1973* (NBG). Groenfontein: *Barker 3049* (NBG).

TULBAGH. De Hoek near Saron: *Compton e.a. NBG 1858/36* (BOL). Roadside: *Hutchinson 363* (BOL, K). Saron: *Andrag STE 19770*.

WORCESTER. Near Worcester: *Leipoldt 4421*, *4440*, *4441*, *4444* (BOL). Stettyn: *Leipoldt 3546* (BOL). Rawsonville—Slanghoek: *de Vos 2119*. Prospect Peak, Hex River Mts.: *Esterhuysen 15880* (NBG, STE). Breede River: *Van Breda* 674 (K).

PAARL. Franschhoek Pass: *de Vos 2010*. Hawekwasberge: *de Vos 2012*.

CAPE. Am Löwenberge u. Grünpoint: *Ecklon* Sept. 10.26 (S). Löwenschwanz: *Ecklon 701* (PRE, M, OXF, S, etc.). Cape Town: *Wall* s.n. (S). Signal Hill: *Dod 1580* (BOL, BM, K), *Wilms 3719* partly (BM, G, K). Cape Flats: *Arbuthnot BOL 24778*, *Rogers 27204* (BM). Near Wynberg: *Schlechter 1241*, *1561* (GRA). Wynberg flats: Hb. *Prior* ann. 1903 (K). Sirkelsvlei: *Lewis SAM 58093*. Smitswinkel Bay: *Barker 121* (K). Simonstown: *Meebold 14832* (M). Hills W of Simonstown: *Dod 1539* (BOL, BM, K). Beyond Simonstown: *Dod 1304* (partly in BM). Red Hill: *Salter 2678* (BOL, BM, K). Hillside above Kalk Bay: *Rendle 110* (BM). Klaver valley: *Salter 3562* (BOL, SAM). Brightwater: *Barker 7180* (NBG). Vlakkenberg vlei: *Compton 20182* (NBG).

STELLENBOSCH. *Strey 577B* (PRE). Stellenbosch flats: *Garside 282* (K). Kanonkop: *de Vos 1638*. Jokhalsvlei, Jonkershoek: *Taylor 4952* partly (PRE).

SOMERSET WEST—STRAND. Lourensford: *Parker 4332* (BOL, NBG, K). Steenbras River mouth: *de Vos 1811*. Strand: *Parker 3709* partly (NBG).

CALEDON—HERMANUS. 2½ mls. S of Villiersdorp: *Leipoldt 3193* (BOL). Between Franschhoek and Villiersdorp: *de Vos 1779*. Hermanus: *Salter 1193* (BOL). Between Bot River and Kleinmond: *Esterhuysen 2933* (BOL). Kleinmond, near rocky shore: *de Vos 1682*. Flats near mountains, Kleinmond: *de Vos 1753*. Betty's Bay: *de Vos 2248*.

BREDASDORP. Elim: *Frowein H.T.M. 16304* (PRE). Waenhuiskrans, Marcus Bay: *Galpin 4977* (PRE).

SWELLENDAM. Near Swellendam: *Grobler 425* (STE). Swellendam—Heidelberg boundary: *Barker 10640* (NBG).

RIVERSDALE. *Muir 4848* (K). ?*Muir 898* (Z).

WITHOUT LOCALITY. *Burman* sub *Crocus capensis* partly (G). Hb. *Drège* sub *Trichonema recurvum Spr. b.* (G, partly K?). *Ecklon 701* (K). *Zeyher 68* partly (GRA), *1605* partly (GRA, G), *4039* partly (G). *Verreaux* ann. 1831 sub *R. rosea* var. *reflexa* Beg. (G).

Flowering period July to September.

This variety is distinguished by rather large, magenta to pink flowers, with stigmas usually not overtopping the anthers. Usually the flowers become purple in herbarium specimens. Variation occurs in the colouring of the flowers and in the amount of sclerenchyma in the leaves. Plants from Porterville, Ceres, and Clanwilliam have a subepidermal layer of sclerenchyma covering each leaf rib, while plants from other localities have the sclerenchymatic sheaths of the vascular bundles free from one another. Intermediates occur around Stellenbosch and Franschhoek, with continuous subepidermal sclerenchymatic layers in some of the leaf ribs.

Specimens from the Riversdale area were described as a distinct species, *R. muirii*. As they differ from other specimens of var. *reflexa* only in the markings on the reverse of the outer perianth segments, and as numerous intermediates occur which cannot readily be placed, the species has not been upheld.

R. rosea var. *reflexa* might easily be confused with three different species, on account of almost similar flowers and bracts. It is distinguished from *R. cruciata* var. *intermedia* by its corm with a rounded base and bent, basal teeth, and by its capsules which dehisce soon after drying out. (*Oldenburg 426* (BM) has no corm and is therefore indistinguishable.) It differs from *R. atrandra* in its bract and bracteole which have somewhat narrower membranous margins, in its peduncles which do not curl up spirally when the mature capsules dry out, and in its leaf anatomy (see under *R. atrandra*). Some herbarium specimens can only be distinguished by their leaf structure. For example *Bolus 2239*, which was cited with *R. rosea* by Baker, proved to be *R. atrandra* var. *esterhuyseniae*, while *Esterhuysen 21754* and *Hafström & Acocks 327* are *R. rosea* var. *reflexa*. This variety differs from *R. obscura* var. *blanda* in the pink of its flowers being more towards the magenta and lilac shades, in its short stem which does not elongate later, its somewhat narrower leaf sheaths, and in its more erect, dried peduncles. Some herbarium collections, however, cannot be distinguished,

e.g. *Compton 11179* (NBG) from Schuster's kraal, Cape Peninsula and *Mathews 12* from Bok Bay, Malmesbury.

Galpin 2685 (PRE) from the Great Winterberg, at an altitude of ca. 2 300 m, and also that part of *MacOwan 246*, from the Hogsback, Victoria East, which in PRE is not *R. autumnalis*, are nearest this variety. Their flowering period, namely March, is unique for this variety.

c. Var. **australis** (Ewart) De Vos comb. nov.

R. cruciata (Ker) Eckl. var. *australis* Ewart, Proc. Roy. Soc. Victoria 19: 43 (Febr. 1907). *R. cruciata* Beg. var. *neglecta* Béguinot, March 1907a p. 337 et 1909 p. 69—syntypes: *Brehm* (M), *Krauss* (G, M). *R. cruciata* Beg. var. *parviflora* Béguinot, March 1907a p. 337 et 1909 p. 69—syntypes: *Zeyher 4040* (G), *?Drège* sub *Trichonema recurvum* Spr. (G), *Schlechter 1567* (Z).

Trichonema longifolium Salisbury 1812 p. 316—iconotype: Bot. Mag. t.575. *T. parviflorum* (Eckl.) Steudel 1841 p. 702 nom. nud. pro parte: non Salisb. (1796) sub *Ixia*.

R. parviflora Ecklon 1827 p. 19 nom. nud. pro parte in herb.: non (Salisb.) Britten (1914). *R. longifolia* (Salisb.) Baker 1877 p. 89 et 1892 p. 103 et 1896 p. 41—iconotype: Bot. Mag. t.575.

Bulbocodium longifolium (Bkr.) Kuntze 1891 p. 700.

Trichonema cruciatum sensu Ker 1802 t.575 excl. syn. Jacq., et 1805 p. 223 et 1827 p. 81 excl. syn. Jacq. & Thunb.; sensu Klatt 1865–66 p. 662 excl. syn. *R. minuta* sensu Ecklon 1827 p. 19 nom. nud. excl. syn. *R. bulbocodioides* sensu Ecklon 1827 p. 19 pro parte et excl. syn.: non Bkr. nec Klatt. *R. rosea* Eckl. var. *parviflora* sensu Lewis 1950 p. 223: non Bkr. 1892 et 1896, ?nec Béguinot 1909. *R. rosea* Eckl. var. *neglecta* (Beg.) sensu de Vos 1965 p. 139, 149.

Icones: Ker 1802 t.575. Herbert MS in Lindley Library, Roy. Hort. Soc., London. Loddiges 1828 t.1370. Ewart 1907 t.12. Ewart & Tovey 1908 t.31 et 1909 p. 58. Kidd 1950 Pl. 63 Fig. 6.

Corm with hard outer tunics and bent teeth at the base. *Leaves* 1—2,5 mm diam., generally compressed cylindrical, with rather wide grooves, usually spreading, each rib with a prominent vein and slender lateral veins. *Peduncles* 3—8 mm long. *Flowers* 15—22 mm, sometimes up to 25 mm long. *Perigone tube* 2—3,5 mm long; *segments* up to 4 mm wide, subacute, pale lilac-pink, (RHS 75A) or sometimes white, with usually a pale yellow cup, outer segments on the backs yellowish-green or with 3—5 dark longitudinal stripes. *Stamens* 7—9 mm long, pale yellow, reaching halfway or higher up the perigone. *Style* 7—10 mm long; *stigmas* not overtopping the anthers.

Lectotype: Ewart cited no particular specimen. In MEL three collections of *Tovey* s.n., identified as *R. cruciata* var. *australis* in Ewart's handwriting and dated 1906, are undoubtedly the original material used by the author. One of

these is selected as lectotype. (In BOL a collection of *Tovey* s.n., received from Ewart and with the latter's handwriting, but dated 1908, is similar to the type material.)

CALVINIA. Top of VanRhyns Pass: *de Vos 1695*.
CLANWILLIAM. *Leipoldt 312* (BOL). Cedarberg: *Stokoe SAM 63692*. Citrusdal: *Leipoldt 4443* (BOL).
CERES. Flats near Ceres: *Guthrie BOL 24783*. Lover's Walk, Ceres: *Guthrie BOL 24781*. Waboomsrivier: *Hanekom 676* (PRE).
WORCESTER. Bainskloof: *Salter 6824* (BOL).
LAINGSBURG. Seweweekspoort: *Phillips 1524a* (SAM).
WELLINGTON. *Rogers & Moss 4297* partly (Z), *Moss 13313* (PRE).
PAARL. Near Bien Donne: *de Vos 1636*.
CAPE. Pr. B. Sp.: *Ecklon* sub *R. minuta* Eckl. (OXF). Camp's Bay: *Krauss, MacOwan HAA 1780* (*MacOwan 3126*) (GRA, SAM, BM, GH, K, P, Z; not BOL and G). Lion's rump above Malay cemetery: *Zeyher 36* (GRA). Mont du Diable: *Drège* sub *R. parviflora* Eckl. Hb. (P). Near Claremont: *Schlechter 1567* (Z). Roadside Kirstenbosch: *Guthrie*, Oct. 1926 partly (BOL). Near Kirstenbosch: *Salter 9263* (BM). Near Wynberg: *Schlechter 1536* (GRA, BM). Cape Flats: *Arbuthnot BOL 20972*. Sherwood, Kenilworth: *L. Bolus* Aug. 1917. Wynberg Hill: *Pillans 10168* (UC).
STELLENBOSCH. Stellenbosch flats: *Duthie 1463* partly (STE). Sidewalks in Mostertsdrift: *de Vos 1096*. Summit of the The Triplets, Jonkershoek: *Kerfoot 5894*.
CALEDON, HERMANUS. Near Caledon: *Fries, Norlindh & Weimarck 1559* (SAM). Beyond Franschhoek Pass: *Phillips 1303* (SAM). Kleinmond near coast: *de Vos 184, 1118* (STE, BOL). 5 mls. E of Caledon: *de Vos 1975*.
SWELLENDAM. Near Swellendam: *de Vos 1977*. Riviersonderend: *Gillett 1137* (BOL).
HEIDELBERG. Between Heidelberg and Swellendam: *de Vos 1969*.
RIVERSDALE. Albertinia: *Marloth 5572* (PRE), *Muir 715* (BOL, partly in PRE). Soetmelksrivier: *Acocks 21381* (NBG, PRE, K).
MOSSEL BAY. 5 mls. W of Mossel Bay: *Acocks 22848A* (PRE).
GEORGE. Between Doringrivier and Klipdrift: *Fourcade 3430* (K). Between Avontuur and Heroldt: *de Vos 2076*.
KNYSNA. Belvidere: *Duthie 1244* (STE). Nature's Valley: *Acocks 21164* partly (K, not in PRE and M). Barrington—Mossel Bay road: *Fries, Norlindh & Weimarck 1290* (S).
UNIONDALE. Top of Prince Alfred Pass: *de Vos 2077*. De Hoek, Joubertina: *Esterhuysen 10700* (BOL).
HUMANSDORP. *Fourcade 3134* (BOL, K), *Galpin 4656* (GRA, PRE), *Thode A1032* (PRE, GH, K). Witelsbos: *Esterhuysen 7120* (BOL), *Fourcade 912* (BOL, GRA, K). Kareedouw: *de Vos 2064*. E of Bloukrans: *Compton 6872* (NBG).
PORT ELIZABETH. P.E.—Thornhill: *Wall 11/11/38* (S), *de Vos 2189*.
SOUTH AFRICA, WITHOUT LOCALITY. *Krauss* sub *R. cruciata* var. *neglecta* Beg. (G, M). *Brehm* sub eodem nomine (M). *Drège* sub *Trichonema recurvum* Spr. b. (OXF, L, ?BM, not in CGE, K, or Delessert in G). *Drège* sub *R. cruciata* var. *parviflora* Beg. (G). *Zeyher SAM 20687, 68* partly (GRA), *4040* (G, P, partly in GRA). *Verreaux* ann. 1831 sub *R. cruciata* var. *parviflora* Beg. (G). *Verreaux* ann. 1839 sub *T. roseum* Ker (G).
AUSTRALIA. Near Melbourne: *Tovey* s.n. 1906 (MEL), 1908 (BOL, MEL). Perth's surroundings: *Ostenfeld 174* (C). King's Park, Perth: *Däniker SA11* (Z). Albany, Western Australia: *Helms 1400* (C), *Meebold 11197* (M). Victoria, Sandringham: *Helms 59* (C). Port Jackson distr., N.S.W.: *Boorman 1902* (B).
TRISTAN DA CUNHA. *Keytel 1819* (K).
ST. HELENA. On uplands: *Melliss* s.n. (K).
CHANNEL ISLANDS. Guernsey, Guet at Cobo: *McClintock* April 1969 (K).

Flowering period August to November.

This variety is an extremely common weed in the western and southern Cape districts, growing along roadsides, untended streets and in farmyards. It is known as "froetang" and children are fond of eating the immature capsules or "knikkertjies". It was introduced into Australia more than 110 years ago,

where it is known as onion grass or Guildford grass and has been proclaimed a troublesome weed. There it shows no variation from the South African material. It has also become naturalised in St. Helena and Tristan da Cunha and has lately been found in Guernsey.

The variety is readily recognised by its small, mostly lilac-pink or sometimes white, star-shaped flowers, and long, usually spreading, compressed-cylindrical leaves, 1—2,5 mm in diameter. In shady places the leaves show an environmental modification, in that they are suberect. Such specimens resemble Ker's figure (Bot. Mag. t.575) and Herbert's unpublished drawing on which the name *R. longifolia* was based. Ker (1802), however, included the plant figured in the Botanical Magazine with *Ixia cruciata* Jacq., and this error led to its being described as varieties of the latter species by Ewart (1907) and by Béguinot (1907a, 1909). There is however, no justification for placing this plant with *R. cruciata*, as its corm with its rounded base and bent, basal teeth, and its capsules, clearly show. Salisbury (1812) was convinced of this and named the plant *Trichonema longifolium*. The latter specific epithet had been used by Herbert on an unpublished drawing of a similar plant. Baker (1877) transferred Salisbury's species to Romulea.

In some herbaria this variety has been identified as *R. rosea* var. *parviflora* Bkr. Baker (1896) based this varietal epithet on a collection in the Kew herbarium labeled *Trichonema recurvum b*, herb. Drège. This sheet, with Baker's identification on it, consists of two species, namely *R. tabularis*, and another which is some variety of *R. rosea* or of *R. obscura*, but is too poor for further identification. Collections labelled Herb. Drège, *T. recurvum Spr.b* in other herbaria consist of *R. rosea* var. *reflexa* (CGE and Delessert's herbarium in G) and var. *australis* (L, OXF, and perhaps in BM and Boissier's herbarium in G). (But as Baker probably did not see any of these, his *R. rosea* var. *parviflora* is regarded as partly synonymous with *R. tabularis* only, the other part being unidentifiable.) Other collections in K, identified as *R. rosea* var. *parviflora* in Baker's handwriting, consist of several species with small flowers, namely *R. rosea* var. *communis* (*Bolus 3746*), *R. tabularis* (*MacOwan 2498*), and *R. obscura* (*Bolus 4601*). This further shows that Baker had no clear idea of his var. *parviflora*.

Béguinot (1909) tried to recircumscribe *R. rosea* var. *parviflora*, but it is not clear what he meant by it. He cited as synonyms: *R. rosea* var. *parviflora* Baker pro parte, and, with question marks, *R. parviflora* Eckl. and *Trichonema parviflorum* Steud. I was unable to find any of the four collections he further cited: those in B were probably destroyed in the last war. The locality for one of these, *Ludwig* s.n., is given as "am die Bergstadt". This probably refers to Bergville near the Drakensberge in Natal, and the plant must then have been *R. campanuloides*. Another, *MacOwan H.A.A. 1750*, is perhaps a typographical

error for *1780*, which is partly *R. tabularis* (in BOL and G) and partly the present weed var. *australis* (e.g. in GRA, BM, K, P).

In the same publication (1909), as well as in 1907a, Béguinot described the present weed also as *R. cruciata* var. *parviflora* and as *R. cruciata* var. *neglecta*, the only difference between the two varieties being in the markings on the perianth.

On account of all this confusion with the epithet *parviflora*, this epithet for the weed has been excluded as dubious, and the next oldest varietal epithet, var. *australis* Ewart (Febr. 1907), adopted. This epithet antedates those of Béguinot (March 1907), namely var. *neglecta* and var. *parviflora* (sub *R. cruciata*) by some weeks only.

d. Var. **communis** De Vos, var. nov.

Varietas foliis 1—2 mm diam., saepe suberectis, floribus et partibus florum majoribus quam varietate australi, perigonio magenteo vel roseo vel albo sine maculis, basi flavo, segmentis exterioribus a dorso plerumque flavo-viridibus raro striatis, stigmatibus apices antherarum non superantibus, distinguitur.

Holotype: *de Vos 1099* in STE.

Corm with hard outer tunics and bent teeth at the base. *Leaves* 1—2 mm diam., compressed cylindrical, often suberect, each rib with a prominent vein and slender lateral veins, grooves usually narrow. *Peduncles* up to 16 cm long. *Flowers* 25—35 mm long, sometimes only 22 mm. *Perigone tube* 3—4 mm long; *segments* 4—8 mm wide, magenta, pink, (RHS 68A, B) or white, with a yellow cup and often a violet-blue zone in the throat, outer segments on the backs usually yellowish-green or sometimes with 3 longitudinal stripes. *Stamens* 8—10 mm long, reaching halfway or slightly higher up the perigone. *Style* 7—10 mm long; *stigmas* usually not overtopping the anthers.

CLANWILLIAM. Between Groot River and Elandskloof: *Leipoldt 3051* (BOL).
PAARL. Suider Paarl: *Roberts & Adendorf Hb. T.M.17631* (PRE).
CAPE. In campis graminosis C.T.: *Bolus 3746* (BOL, K). Rosebank: *Bolus 3746* (BOL). Above Cape Town: *Tyson 2455* (GRA). Signal Hill: *Wilms 3724* (K). Sherwood, Kenilworth: *L. Bolus* Aug. 1917 (BOL). Wynberg Park: *Dod 1489* (BOL, K).
STELLENBOSCH. Near Papegaaisberg: *de Vos 1099*. Stellenbosch Flats: *de Vos 1093*. Faure: *Van Niekerk 287* (BOL). Jonkershoek Valley: *Lewis 1663* (SAM).
CALEDON. Sir Lowry's Pass: *Olafstrom & Lindeberg* s.n. (S), *Wall* s.n. (S). Near Villiersdorp: *Bolus 5245* (BOL). Kleinmond: *de Vos 1104*. Hermanus: *Olafstrom & Lindeberg* s.n. (S), *Rogers 26573* (Z), *Guthrie* Nov. Dec. 1926 (BOL).
BREDASDORP. Elim: *Stolz* (S).
RIVERSDALE. Oakdale: *Muir 2850* (BOL).
MOSSEL BAY. Robinson Pass: *Wall* s.n. (S), *Esterhuysen 19412* (BOL).
HUMANSDORP. *Gillett 2255* (BOL).

This variety consists of such specimens of *R. rosea*, pink or white, which cannot be readily placed with any of the other varieties. It differs from the typical variety in its shorter styles, somewhat narrower perianth segments, and

in corms which usually are not depressed and have harder outer corm tunics. In the south-western districts it flowers earlier (August to October) than the typical variety, but in Caledon and districts farther east, where it has white flowers, the flowering period is from October to January.

It differs from *R. rosea* var. *reflexa* in its often slightly narrower perianth segments, with the outer ones usually yellowish-green on the backs. It is closely allied to var. *australis*, and may be a form of the latter with more erect leaves and larger flowers, and with the outer perianth segments generally yellowish-green on the backs, or, only rarely, striped. The size of the flowers in the two varieties is genetically fixed and does not vary with changes in the environment. Hybrids can readily be obtained artificially, and probably also occur in nature, as intermediates are found, e.g. *de Vos 1593* from the Stellenbosch flats. *Barker 4542* (NBG) from Bredasdorp is nearest this variety.

In some herbaria this variety has been identified as *R. longifolia* Bkr.

e. Var. **elegans** (Klatt) Béguinot, Malpighia 23: 63 (1909).

R. elegans Klatt 1882 p. 400 et 1895 p. 164 pro parte excl. cit. *Zeyher 4043;* Baker 1892 p. 103 excl. cit *Zeyher 4043*, et 1896 p. 42 pro parte excl. var. et cit. *Zeyher 4043;* Lewis 1950 p. 223 excl. var.

Trichonema cruciatum sensu Klatt 1865–66 p. 718 pro parte: non Ker 1802 et 1805 nec Aiton 1810.

Corm with hard outer tunics and bent teeth at the base. *Leaves* ca. 1 mm diam., subterete, suberect or sometimes spreading, each rib with a prominent vein, grooves narrow. *Peduncles* 5—12 cm long. *Flowers* 30—48 mm long. *Perigone tube* 4—6 mm long; segments 8—15 mm wide, rarely narrower, acute to subacute, white with a golden-yellow cup, outer segments red, reddish-purple or reddish-green on the backs, irregularly marked or with a pale median line. *Stamens* 12—16 mm long, golden-yellow, reaching less than halfway or higher up the perigone. *Style* 10—12 mm long; *stigmas* reaching halfway up the anthers to higher than their tips.

Holotype: Klatt's only citation (1882) is *Zeyher 1602* in Herb. Klatt. This, or part of it, is in S, with Klatt's handwriting and signature on the label and is the holotype. Isotypes in GRA, PRE, SAM, B, G, Z, and partly in K.

CAPE. Doornhoogte: *Zeyher 1602* partly. Cape Flats: *Zeyher 430* (SAM), *Moss 4293* (Z). Kenilworth Race Course: *Lewis 59*, *1599* (SAM), *Salter 7637* (BOL, SAM), *Barker 4116*, *4794* (NBG).

SWELLENDAM. 2½ mls. E of Swellendam: *de Vos 1966*. Between Swellendam and Stormsvlei: *de Vos 1909*.

Schlechter 1563 (GRA, M, Z) from near Wynberg is probably this variety. *Zeyher 4670*? partly (GRA) may be this variety or may perhaps be *R. obscura* var. *blanda*.

This rare variety seemed to be confined to the Cape Flats, until the discovery of plants near Swellendam which could not be distinguished from it. At

first I tried to keep the taxon a distinct species, as Lewis treated it (1950). But the recent collections show clearly that the only substantial difference between this taxon and *R. rosea* lies in the colouring of the perianth. The chromosome number and leaf structure of the two groups are also similar.

5.5 Subsection Cruciatae De Vos subsect. nov.

Cormus obovoideus, basi acutus; tunicae basi in dentibus rectis acuminatis ad acumen basilare convergentibus fissae. *Folia* 1—4 mm lata, filiformia vel cruciata in sectione transversali, sulcis angustis vel latis. *Pedunculi* post anthesin suberecti vel subpatentes. *Flores* magni vel mediocres, magentei vel lilacini vel rosei, plerumque maculis fuscis in fauce. *Capsulae* subrostellatae, dehiscentia retardata.

Type species: *R. cruciata* (Jacq.) Bkr.

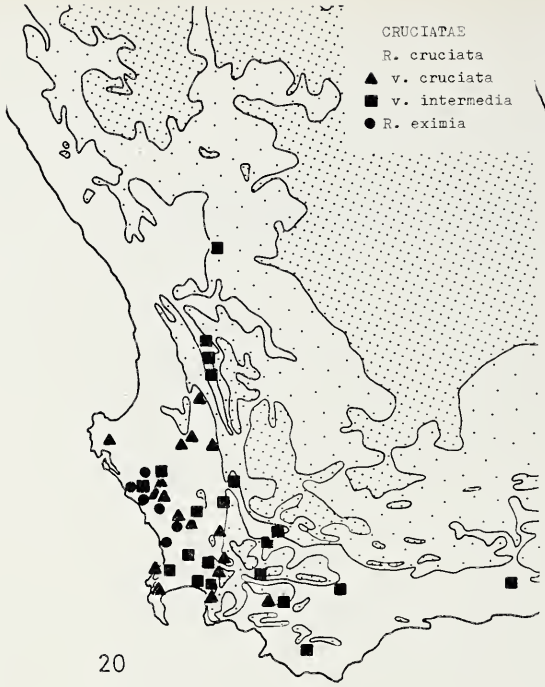
Corm obovoid, pointed at the base; tunics split into straight, acuminate teeth converging to the basal point. *Leaves* 1—4 mm diam., filiform, or cross-shaped in transverse section, with narrow or wide grooves. *Peduncles* remaining straight after flowering or slightly patent. *Flowers* longer than 25 mm, magenta to lilac-pink or rose, often with dark blotches in the throat. *Capsules* slightly beaked, with a delayed dehiscence.

Leaf anatomy. Rib margins without a vascular strand against the fibre bundles. Grooves when wide, sometimes with a small longitudinal ridge in their centre. Epidermis in the grooves papillose, and on the ribs sometimes lignified (*R. eximia*). Short crystals absent; styloids scattered and sometimes in the ends of the U-shaped parenchymatic bundle sheaths.

This subsection is closely allied to subsection *Roseae*, the chief differences being in their corm shape and splitting of the corm tunics, and also in the slightly beaked capsules with a delayed dehiscence of subsection *Cruciatae*.

58. **Romulea cruciata** (Jacq.) Bkr. J. Linn. Soc. 16: 89 (1877) pro parte, excl. syn. *Trichonema cruciatum* Ker.

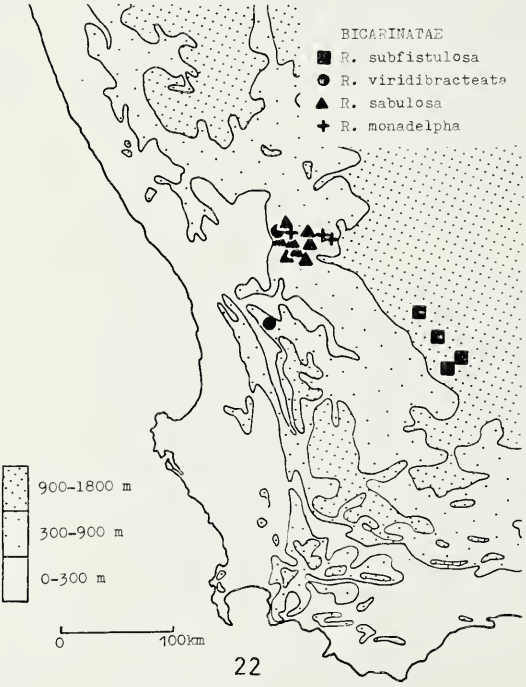
Plants 15—40 cm tall. *Corm* 8—15 mm diam., obovoid, pointed at the base; tunics hard, smooth, brown, with straight, acuminate teeth converging towards the basal point, and apical fibres 3—10 mm long. *Stem* short, hidden by the leaf bases. *Basal sheaths* usually 2, to 60 mm long. *Leaves* 2—5 or more, basal, cross-shaped in transverse section, or filiform and terete, suberect or spreading, 14—40 cm long, less than 1 to 4 mm diam., grooves wide or narrow, sheathing leaf bases 3—5 mm wide. *Peduncles* 40—100 mm long, semiterete, erect or suberect. *Bract* greenish or purplish-red, with very narrow, hard visible, membranous margins, narrowly triangular, 10—28 mm long, finely and densely veined, acute. *Bracteole* subherbaceous in the middle, with wide, brown or


CRUCIATAE
R. cruciata
v. cruciata
v. intermedia
R. eximia

20


HIRTAE
R. hirta
R. tetragona
v. tetragona
v. flavandra

21


BICARINATAE
R. subfistulosa
R. viridibracteata
R. sabulosa
R. monadelpha
900-1800 m
300-900 m
0-300 m
0
100km

22


LOMUREA
R. hantamensis
R. syringodeoflora
R. stellata

23

brown-streaked or rarely colourless membranous margins narrowing towards the subacute tip. *Flowers* 2—4 or more, 22—35 mm or up to 42 mm long. *Perigone tube* 3—5 mm long, funnel-shaped; *segments* narrowly obovate, 20—35 mm long, 5—10 mm wide, acute to subobtuse or sometimes obtuse, magenta-pink to lilac-pink, with a golden-yellow or orange-yellow cup, a purplish, blue or blue-black blotch on each segment in the throat from which a dark median line extends downwards; outer segments purplish, pink or greenish on the backs or with 5 dark longitudinal lines and fine feathered veining in between. *Stamens* erect, inserted near the base of the perigone tube, not reaching halfway up the perigone; *filaments* 3—6 mm long, pilose near the base; *anthers* 4—8 mm long, at first joined at the tips, orange or golden-yellow, often with dark lines of dehiscence. *Style* 9—11 mm long; *stigmas* usually not overtopping the *anthers*. *Capsules* narrowly ellipsoidal, often shortly beaked at the top, with a delayed dehiscence, on peduncles which remain erect or become somewhat patent after flowering. *Chromosome number* 2n = 18 (*de Vos 1620*, *1092*, *1715*).

Holotype: Jacquin, Icon. Pl. Rar. 2 tab. 290 (1786–93).

Flowering period July to September.

This species is allied to *R. rosea* and differs in its corm which has a pointed base and almost straight, acuminate, basal teeth, in the peduncles which remain almost erect or become patent after flowering, in the anthers which do not reach halfway up the perigone and in the somewhat beaked capsules with delayed dehiscence.

Ker (1802, 1805) misidentified the common Western Province weed as *Trichonema cruciatum*, and in this he was followed by several other workers, e.g. Loddiges (1828) and, under *Romulea*, by Ecklon (1827), Béguinot, and some workers in Australia. Béguinot (1907a) recircumscribed *R. cruciata* (Jacq.), giving it four varieties, and added in 1909 a fifth, var. *hirsuta*. Under the latter he cited only one collection, that of *Verreaux* ann. 1831 in G, which is *R. flava*. His varieties *parviflora* and *neglecta* cannot be distinguished from each other, both representing the common weed which is better placed with *R. rosea* on account of its rounded corm, its peduncles which are arcuate after anthesis, and its capsules with early dehiscence. His var. *vulgaris* is a form of the typical *R. cruciata* with somewhat narrower, shorter, and more spreading leaves, stronger bracts, and smaller flowers. As many intermediates connecting the typical variety and var. *vulgaris* have now been found, the latter cannot be upheld as a distinct variety.

KEY TO THE VARIETIES

Widest leaves more than 1 mm wide, generally 2—4 mm, with wide grooves, sometimes with a narrow longitudinal ridge in the middle of each groove a. Var. *cruciata*
Widest leaves filiform, 1 mm or generally less in diam., with narrow grooves. b. Var. *intermedia*

MAPS 20–23.

Geographical distribution: 20, species of subsection *Cruciatae;* 21, section *Hirtae;* 22, section *Bicarinatae;* 23, subgenus *Lomurea*.



FIG. 88.

R. cruciata var. *cruciata* (*de Vos* no. *1620*). 1, plant $\times\frac{7}{8}$. 2, corm seen from different sides. 3, perianth segment, upper surface $\times 1$. 4, bract and bracteole $\times 1$. 5, mature capsules $\times 1$. 6, transverse section of leaf.

a. Var. **cruciata**

R. cruciata (Jacq.) Baker 1877 p. 89 pro parte (excl. syn. *Trichonema cruciatum* Ker) et 1896 p. 42 pro syn.; Klatt 1882 p. 401 et 1895 p. 164 excl. syn. Ker; Béguinot 1907a p. 335 excl. var. 3, 4 et aliquot syn., et 1907b p. 103 et p. 472 pro parte et 1908a p. 158 pro parte et 1909 p. 66 excl. var. 3—5 et aliquot syn.: non Ecklon 1827, nec Lewis 1950. *R. cruciata* (Jacq.) Beg. var. *vulgaris* Béguinot 1907a p. 336 pro parte et 1908a p. 158 et 1909 p. 68 excl. cit. *Schlechter 1047*.

Ixia cruciata Jacquin 1786–93 t.290 et 1796 p. 16; Willdenow 1797 p. 197; Vahl 1806 p. 51; Poiret 1813 p. 201; Roemer & Schultes 1817 p. 377 excl. syn. Ker. & Thunb.

Trichonema cruciatum Aiton 1810 p. 83 excl. syn. Ker; Klatt 1865–66 p. 662 excl. aliquot syn.: non Ker 1802, 1805.

Bulbocodium cruciatum (Jacq.) Kuntze 1891 p. 700 excl. syn. Baker pro parte.

Icon: Jacquin 1786–93 t.290; Dietrich 1831 t.6; this work Fig. 88.

Plants robust. *Leaves* 1—4 mm wide, often cruciform in cross section, grooves wide, sometimes with a narrow longitudinal ridge in the middle of each groove. *Flowers* lilac-pink to magenta-pink (RHS 68B, C), often with a blue zone in the throat. *Capsules* 10—14 mm long.

PIKETBERG. *Fremantle* (BOL). In collibus ad flumen Berg Riv. pr. Piketberg: *Schlechter 5260* (BOL, GRA, Z). Near Berg River bridge: *L. Bolus & Lewis, NBG 1869/32* (BOL, GRA, K). Hill near The Rest: *de Vos 1620* (STE). Septemberskraal, Porterville: *Loubser 2124* (STE). 2 mls. S of Porterville: *Loubser 975* (NBG).

VREDENBURG. Near Vredenburg: *Lewis 1059* (SAM).

MALMESBURY. 3 mls. N of Darling: *Hutchinson 232* (K partly, not PRE). Darling: *Cloete NBG 1324/13* (BOL). Southern slopes of Contreberg: *Pillans 6943* (BOL). Between Darling and Ysterfontein: *de Vos 1568*. Kalbaskraal: *L. Bolus & Lewis BOL 20289* partly. Flats near Horingkloof, Paardeberg: *Lewis & Salter 3557* (BOL).

CAPE. Near Cape Town: *Zeyher SAM 20703*. Lion's Rump: *Zeyher SAM 20711* partly. Leeuwestaart: *Zeyher 4670* partly (SAM, GRA). Löwenschwanz: *Ecklon 700* (S partly). Signal Hill: *Wilms 3719* partly (BM, G, K, not in Z), *Olafstrom & Lindeberg* s.n. (S). In clivis montis Leonis: *Schlechter 1047* (G, P partly, not in GRA or Z). Wynberg: *Aberth Hb. Conrath 610* (Z).

PAARL. Simondium: *Schelpe 4163* (BM).

WELLINGTON. Near Wellington: *Grant 2299* (BOL).

STELLENBOSCH. Slopes of Stellenbosch berg: *de Vos 1633*. Helshoogte: *Strey 578* (PRE).

SOMERSET WEST, STRAND. Western slopes of Sir Lowry's Pass: *de Vos 2139*.

CALEDON. Swartberg near Baths (51.8): *Drège Irid. 197* (G).

WITHOUT LOCALITY. *Brelun* ann. 1820 (M). *Bowie 397* (G). *Thom* (K).

In his coloured drawing of *Ixia cruciata*, the iconotype, Jacquin showed a cross section of a leaf with a narrow ridge in the middle of each of the four wide grooves. These ridges are not a constant feature of the leaf structure and have recently been found in only a few collections.

b. Var. **intermedia** (Beg.) De Vos stat. nov.

R. intermedia Béguinot (pro hybr.) Bot. Jb. 38: 339 (1907a)—type: *Zeyher 4044* (G holo; GRA, K, etc.); et 1907b p. 471 et 1909 p. 66. *R. ambigua* Béguinot

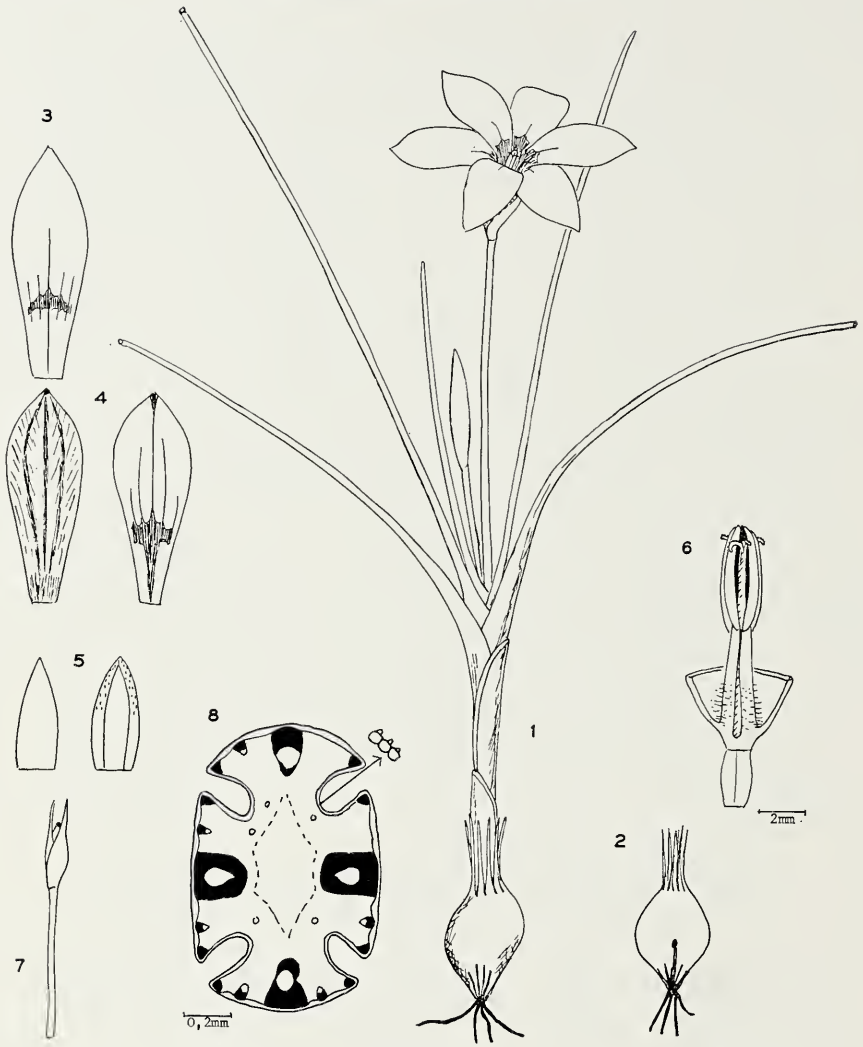


FIG. 89.

R. cruciata var. *intermedia* (*de Vos* no. *1092*). 1, plant $\times\frac{7}{8}$. 2, corm seen from opposite side. 3, outer perianth segment, upper surface. 4, outer and inner segments, lower surface. 5, bract and bracteole $\times 1$. 6, pistil, stamens, and perianth tube. 7, mature capsule $\times 1$. 8, transverse section of leaf.

(pro hybr.) 1907a p. 338 pro parte—syntypes: *Schlechter 4844*, *10784* (GRA, PRE, B, G, etc.)—et 1907b p. 106 et p. 473 pro parte et 1909 p. 80 pro parte, excl. cit. *Ecklon 703*.

In some herbaria this has been wrongly identified as *R. gracillima* Bkr. or as *R. rosea* Eckl. var. *speciosa* Bkr.

Fig. 89.

Leaves filiform, terete, ca. 1 mm or generally less than 1 mm in diam., with narrow grooves. *Bracts* and *bracteoles* often reddish and somewhat less herbaceous. *Flowers* magenta-pink (RHS 73A, 74A, B) with voilet blotches in the throat. *Capsules* 6—10 mm long.

Holotype: *Zeyher 4044* in G. Isotypes in GRA, K, P, S, Z.

CALVINIA. Near Nieuwoudtville: *de Vos 1982*.

CLANWILLIAM. Olifants River in collibus pone Brakfontein: *Schlechter 10784* (GRA, PRE, B, G, K, S). Near Clanwilliam: *L. Bolus BOL 23191*. 6 mls. N of Citrusdal: *Compton 22768* (NBG).

MALMESBURY. Ca. 2 mls. from Paardeberg: *L. Bolus BOL 24348*. Roadside between Malmesbury and Hopefield: *de Vos 1774*.

TULBAGH. Piketberg Road: *Schlechter 4844* (GRA, C, Z).

WORCESTER. *Rogers 16322* (*Z*). Stettyn: *Leipoldt 3543* (BOL).

WELLINGTON. Between Hermon and Bushman's Rock: *L. Bolus 24785* (BOL).

CAPE. Cape Town: *Meebold 91* (M). Lion's Back: *Salter 330/1* (BM). Signal Hill: *Marloth 210* (PRE). Camp Ground: *Dod 3032* (BOL). Rondebosch Common: *Davis SAM 61745*.

BELLVILLE. Fisantekraal: *Van Niekerk 158* (BOL).

STELLENBOSCH. Stellenbosch Flats: *L. Bolus BOL 24347*, *de Vos 1092*, *1715*, *Rehm* s.n. (M). Roadside near Koelenhof, *de Vos 1693*.

SOMERSET WEST, STRAND. Strand: *Parker 3709* (BOL, K, GH). Western slopes of Sir Lowry's Pass: *de Vos 2140*.

CALEDON. Swartberg: *Ecklon & Zeyher 197* (P). Swartberg-Riviersonderend: *Zeyher 4044* (GRA, Z). Villiersdorp: *Salter 1129* (BOL). Shaw Mt.; *Barker 122* (K).

BREDASDORP. Near Elim: *de Vos 2051*.

RIVERSDALE. Between Gouritz River and Albertinia: *de Vos 2161*.

WITHOUT LOCALITY. *Zeyher 4044* (G, K, P, S). *Burchell* s.n. (K). *Brehm* ann. 1820 sub *Ixia cruciata* Jacq. (M).

R. intermedia, described by Béguinot as a hybrid between *R. rosea* var. *elegans* and *R. cruciata* var. *vulgaris*, has a corm typical of *R. cruciata*, and narrow leaves. Plants, corresponding to Béguinot's type specimens, are very common on the Stellenbosch Flats. Here they breed true and no indication of hybridity has been found. As they also have the typical corm, shortly beaked capsules with delayed dehiscence, and peduncles which remain almost straight after flowering, and as they and *R. cruciata* are interfertile, this group has now been placed with *R. cruciata*, as var. *intermedia*.

Var. *intermedia* has narrow, filiform leaves with narrow grooves and only three vascular bundles in each rib. In other anatomical features, the leaves of the two varieties are similar, except that in a few collections of var. *intermedia* the sclerenchyma of all three, or some, of the vascular bundles is joined to form a subepidermal layer over the rib.



FIG. 90.

R. eximia (*de Vos* no. *1687*). 1, plant $\times\frac{1}{4}$. 2, perianth segment, upper surface. 3, outer and inner segments, lower surfaces. 4, bract and bracteole $\times 1$. 5, pistil, stamens, and perianth tube. 6, mature capsules $\times 1$. 7, transverse section of leaf.

59. **Romulea eximia** De Vos sp. nov.

R. speciosa auct. non Bkr.: Béguinot 1909 p. 85 pro parte, excl. syn.

Fig. 77, 90.

Cormus obovoideus 8—15 mm diam. basi acutus, tunicis rigidis laevibus, pleurumque fuscis, dentibus rectis acuminatis ad acumen basilare convergentibus, apice fibris ca. 5 mm longis praedito. *Caulis* brevis vaginis foliorum obtectus. *Vaginae basilares* plerumque 2. *Folia* 3 vel plura basilaria filiformia 25—45 cm longa, ca. 1 mm vel ad 1,5 mm diam. suberecta vel aliquando curvata, sulcis angustis, basibus vaginantibus 4—7 mm latis. *Pedunculi* 50—100 mm vel ad 150 mm longi semiteretes suberecti vel leviter curvati. *Bractea* viridis vel purpureo-brunnea marginibus membranaceis perangustis aegre manifestis, anguste triangularis 20—30 mm longa, nervis tenuibus approximatis, acuta vel subacuta. *Bracteola* marginibus membranaceis latis brunneis, acuta vel subobtusa. *Flores* 2—3 vel plures, 40—50 mm vel ad 60 mm longi. *Tubus perigonii* 5—8 mm longus infundibularis; *segmenta* anguste elliptica vel anguste obovata 33—40 mm vel ad 50 mm longa 7—14 mm lata, segmentis interioribus saepe aliquantum brevioribus quam exterioribus, obtusa vel subacuta rosea in fauce maculis atrorubris notata, basi viridiflava striis mediis tenuibus atratis e maculis ad basin contractis, segmenta exteriora a dorso irregulariter rubro et viridiflavo notata. *Stamina* erecta, prope basin perigonii inserta, plerumque non dimidium perigonii attingentia; *filamenta* 9—12 mm longa, prope basin pilosa, lutea; *antherae* 7—12 mm longae aureae, plerumque striis dehiscentiae atropurpureis. *Stylus* 18—20 mm longus flavidus; *stigmata* plerumque aliquanto infra apices antherarum attingentia. *Capsulae* ellipsoidae, ca. 10 mm longae, dehiscentia retardata, in pedunculis suberectis vel leviter curvatis.

Holotype: *de Vos 1687* in STE.

Plants 25—45 cm tall. *Corm* obovoid, 8—15 mm diam., pointed at the base; tunics hard, smooth, mostly dark brown, with straight acuminate teeth converging towards the basal point, and apical fibres ca. 5 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* usually 2, 10—60 mm long. *Leaves* 3 or more, basal, filiform, 25—45 cm long, ca. 1 mm or to 1,5 mm diam., suberect or sometimes curved, grooves narrow, sheathing leaf bases 4—7 mm wide. *Peduncles* 50—100 mm or up to 150 mm long, semiterete, suberect or slightly curved. *Bract* purplish-brown or green with very narrow, hardly visible, membranous margins, narrowly triangular, 20—30 mm long, finely striate, acute or subacute. *Bracteole* with wide brown membranous margins, acute to subobtuse. *Flowers* 2—3 or more, 40—50 mm or up to 60 mm long. *Perigone tube* 5—8 mm long, funnel-shaped; *segments* narrowly elliptical or narrowly obovate, 33—40 mm or up to 50 mm long, 7—14 mm wide, inner segments often slightly shorter than outer, obtuse or subacute, old-rose to dark old-rose (RHS 47C, 48B, 51B,

52C), with a dark red blotch on each segment in the throat, cup pale or greenish-yellow with slender dark median lines tapering downwards from the blotches, outer segments irregularly marked on the backs with red and greenish-yellow. *Stamens* erect, often not reaching halfway up the perigone; *filaments* 9—12 mm long, pilose near the base, yellow; *anthers* 7—12 mm long, golden-yellow, often with dark lines of dehiscence. *Style* 18—20 mm long, pale yellow; *stigmas* very slender, usually reaching slightly below tips of anthers. *Capsules* ellipsoidal, ca. 10 mm long, with delayed dehiscence, on peduncles which remain suberect or slightly curved. *Chromosome number* 2n = 18 (*de Vos 1687*).

PIKETBERG. Hort. *L. Bolus 24780*.
MALMESBURY. In arenosis circa Groen Kloof: *MacOwan HNAA 525* partly (BOL, BM, G, GH, K, P, probably not in GRA). Circa Darling: *Bolus BOL 12837* (NU). Near Darling: *Salter 2708* (BOL, K), *Compton NBG 1168/26*, *de Vos 1687*. Darling: *Stokoe SAM 58337*. On road to Darling: *Leipoldt BOL 21267*. Near Mamre: *L. Bolus BOL 21262* partly. Mamre Road: *Kies 148* (NBG). 3 mls. E of Mamre Rd. Station: *Salter 6865* partly (BOL). 4 mls. from Mamre: *Lewis 1058* (SAM). Mamre Hills: *Barker 3839* (NBG), *Compton 9436* (NBG). Near Kalbaskraal: *L. Bolus & Lewis BOL 20289* partly. Near Ysterfontein: *Salter 1344* (K). Between Darling and Ysterfontein: *de Vos 1463*. Darling, flowered at Kirstenbosch: *Compton NBG 1168/26* (BOL). From Malmesbury, in cultivation at Komgha: *Flanagan 1745* (PRE). At turn-off to Gansekraal: *Barker 732* (NBG). Darling Flora Reserve: *Rycroft 1983* (NBG). Swartwater near Darling: *Barker 10648* (NBG). Melkbosstrand: *Bond 504* (NBG).
CAPE OF GOOD HOPE, WITHOUT NEARER LOCALITY. *Meebold 14833* (M).

Flowering period August to September.

This species apparently has a local distribution with a diameter of about 50 km, from near Ysterfontein to the vicinity of Kalbaskraal. It is readily distinguished by its large, old-rose flowers with dark red blotches in the throat and a pale yellow cup, and by its corm with a pointed base and almost straight basal teeth. Hardly any variation occurs in its flower colouring, and only twice has a paler pink variation been recorded.

The flower of *R. eximia* can be confused with the sympatric *R. hirsuta*. It differs from the latter in its greenish-yellow cup, and also in its corm shape. From the sympatric *R. obscura* var. *blanda*, also with old-rose flowers, it differs in the dark red blotches in the throat of the perianth, as well as in its corm shape and chromosome number.

R. eximia has the same chromosome number as *R. rosea* and *R. cruciata*. It stands closest to the latter species, differing in size and colouring of the flower and in leaf structure. The slender, filiform leaves constantly have a small-celled, lignified epidermis with the anticlinal cell walls thicker than the external walls, and a subepidermal layer of sclerenchyma across each rib. The lignified epidermis distinguishes this species not only from *R. cruciata*, but also from all other South African romuleas. Cross pollinations between *R. eximia* and *R. cruciata* usually gave rise to shrivelled seeds in enlarged capsules, except once, when two capsules were obtained with 28 filled out seeds from which seven hybrid plants were obtained.

In some herbaria, specimens of *R. eximia* have been erroneously identified as *R. rosea*, *R. rosea* var. *speciosa*, or as *R. speciosa*, but the species differs from the coloured drawings on which *R. speciosa* is based in its short, hidden stem, its corm with a basal point, and in the markings on the perianth.

6. Section Hirtae Beg.

Stirps Hirtae Béguinot, Annu. Conserv. Jard. Bot. Genève 11–12: 159 (1908) et 1909 p. 81.

Corm rounded at base with tunics split into long bent basal teeth or fibres, or obliquely flattened towards the base with a crescent-shaped basal ridge and tunics often splitting into minute parallel fibrils on the ridge. *Stem* short, hidden. Leaves 4-winged, lateral ribs reduced, 2—5 mm wide, ciliate on wing margins, rarely glabrous. *Flowers* pale yellow or lilac-pink. *Perigone tube* short. *Stamens* inserted near or at base of perigone tube; *anthers* erect or circinal.

Type species: *R. hirta* Schltr.

Leaf anatomy. The 4-winged leaf is a modification of the typical 4-grooved leaf of the genus. The lateral ribs are reduced and the pairs of grooves have become confluent, forming on each side a single wide, shallow groove. The two median ribs are enlarged, their margins forming four longitudinal wings. These possess several vascular bundles with sclerenchymatic bundle sheaths against the epidermis. Wing margins with a fibre bundle, ciliate, rarely glabrous. Reduced lateral ribs with a single large vascular bundle. Stomata present in the shallow grooves amongst papillose epidermal cells. Styloids scattered in the mesophyll and subepidermal in costal zones; short crystals absent.

The two species in this section were at first thought to be totally unrelated, as their corms differ (de Vos 1970b). But the leaves are similar as regards both external morphology and internal structure, and some degree of alliance probably exists between the two species. The similar chromosome numbers may also point to this. No breeding experiments were, however, carried out to get further evidence.

60. **Romulea hirta** Schltr. Bot. Jb. 27: 91 (1900); Béguinot 1907b p. 106 et p. 473 et 1909 p. 82; de Vos 1952a p. 80 et 1952d t. 1137 et 1965 p. 138.

Icon: Flow. Pl. Afr. 29 t.1137 (1952).

Plants 10—30 cm tall. *Corm* subglobose or ovoid, 8—12 mm diam.; tunics hard, smooth, brown, split at base into acuminate fibres or teeth sharply bent towards one side, and at top of corm into fibres 3—5 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* mostly 2, 10—80 mm long. *Leaves* 3—6, basal, 4-winged, lateral ribs reduced and median ribs widened to form the

longitudinal wings, erect or arcuate, ciliate on the margins of the wings or glabrous, 10—30 cm long, 2—5 mm wide, narrowed in the lower half above a 3—5 mm wide leaf sheath. *Peduncles* 40—200 mm long, semiterete, glabrous or minutely ciliate on the two sharp angles. *Bract* green, sometimes submembranous towards the base, with very narrow membranous margins, narrowly elliptical to narrowly ovate, 10—18 mm long, acute. *Bracteole* with wider membranous margins which are brownish towards the scarious tip. *Flowers* 1—4, 18—35 mm long. *Perigone tube* 4—5 mm long, funnel-shaped; *segments* narrowly elliptical, 12—25 mm long, 4—8 mm wide, subobtuse to acute, often slightly emarginate, pale yellow (RHS 10B–D), frequently with a diffuse, pale, reddish-brown or greenish-brown transverse band just below the middle; outer segments greenish-yellow on the backs. *Stamens* erect; *filaments* 5—6 mm long, minutely pilose in the lower half or subglabrous; *anthers* 3—5 mm long, golden yellow. *Style* 8—14 mm long; *stigmas* to 3 mm long, reaching halfway up the anthers or almost to their tips. *Capsules* subglobose to ellipsoid, to 10 mm long, on suberect or slightly bent peduncles. *Chromosome number* 2n = 26 (*de Vos 1737, STE 30199*)

Holotype: *Schlechter 8766* in B. Isotypes in BM, K, P, S, Z.

CALVINIA. Near Grasberg: *Lewis 5835* (NBG), *de Vos 2022*. Beyond Grasberg: *de Vos 2027*. Akkerdam, lower slopes of Hantam Mts.: *Barker 9326* (NBG). SW slopes of Hantam Mts. near Skiethuis: *de Vos 2090*. 3 mls. W of Nieuwoudtville: *Barker 6472* (NBG). Flowered in STE BG: *de Vos 1737*.

CLANWILLIAM. Koudeberg: *Schlechter 8766*. Between Pakhuis and Oumuur, Biesiesfontein: *Leipoldt BOL 20771*.

SUTHERLAND. Damslaagte, Klein Roggeveld: *Olivier STE 30199*. 23 mls. N of Matjiesfontein: *de Vos 1930*.

Flowering period July to September.

In stony ground on plateaux.

This species is distinguished by its pale yellow perianth, four-winged leaves, and corm with bent teeth at the base. The teeth do not show longitudinal grooves as in the subsection *Atrandrae*.

Variation occurs in the size of the flowers and in the degree of ciliation on the leaves. In *The Flowering Plants of Africa* l.c. a small-flowered form is figured. Plants from Nieuwoudtville, grown in the botanic garden, have larger flowers, while the type specimens have flowers intermediate in size. These differences are, however, not such that separation into distinct varieties is warranted.

Some specimens of the *STE 30199* collection have glabrous leaves and others are ciliate on the leaf wings, as in the type material. The ciliation is dense with short hairs or can be sparse with longer hairs. This character, on which the name of the species has been based, is therefore not constant.

61. **Romulea tetragona** De Vos, Flow. Pl. Afr. 29: 1136 (1952c).

Plants 8—30 cm tall. *Corm* 8—10 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge, the tunics hard, smooth, brown, often splitting into minute parallel fibrils on the basal ridge, and with apical fibres 5—10 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* mostly 2, 10—40 mm long. *Leaves* 4 or more, basal, 4-winged, lateral ribs reduced and median ribs widened to form the longitudinal wings, suberect or arcuate, ciliate along the wing margins or sometimes glabrescent, 7—30 cm long, 1,5—5 mm or sometimes up to 7 mm wide, narrowed in the lower half above a 4—8 mm wide leaf sheath. *Peduncles* 40—180 mm long, hirsute, erect or suberect. *Bract* green with very narrow white, brown, or brown-speckled membranous margins widening upwards to a small scarious tip, ovate to narrowly ovate, concave, 10—18 mm long, with closely spaced veins, hirsute in the lower half or on some of the veins. *Bracteole* sometimes slightly longer and narrower than the bract, sometimes glabrous, with wide membranous margins and an acute or emarginate or lacerated scarious tip. *Flowers* 1—4 or more, 16—35 mm long. *Perigone tube* 3—6 mm long, cup-shaped; *segments* obovate, narrowly obovate or elliptical, 12—28 mm long, 5—8 mm or up to 12 mm wide, acute or apiculate, rarely subacute, violet-rose to lilac (RHS 65A–D, 68B), sometimes with blue tips, rarely salmon-pink, cup violet, brownish violet or greenish yellow, with a violet blotch or transverse band on each segment in the throat, outer segments greenish and purple-veined on the backs. *Stamens* inserted in the base of the perigone tube; *filaments* 3—4 mm long, minutely pilose towards the base; *anthers* 2—6 mm long incurved, circinal or suberect, purple or golden yellow, with pollen reddish-brown, orange, or golden-yellow. *Style* 5—12 mm long; *stigmas* ca. 2 mm long and recurved, or rarely 5 mm long, attenuated, whitish, reaching below to slightly above the anther tips. *Capsules* shortly oblong or subglobose, 8—10 mm long, on curved peduncles which straighten somewhat later.

Holotype: *de Vos 1569* in STE.

Flowering period August to September.

This species is readily distinguished by its four-winged leaves with reduced lateral ribs, general hairiness of the leaves, peduncles, and bracts, and by generally lilac-pink flowers. The leaf has undergone the same evolutionary development as in *R. hirta;* in these two species the leaves are identical, also in anatomical details, e.g. in the presence of epidermal papillae which often occur in more than one row on the epidermal cells in the grooves, and in the presence of long, subepidermal crystals in the costal zones. In herbarium material the wings are not as evident as in fresh material.

R. tetragona does not seem to be closely allied to any other species of Romulea. The similarities in leaf structure and in chromosome number in this


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M. P. de Vos del.

species and *R. hirta* may indicate some degree of relationship. The two species have therefore been placed together in a section, notwithstanding the difference in corm structure.

Variation occurs in *R. tetragona*, not only in the degree of hairiness, but also in the size of the leaf and flower, the length of the style branches and stigmas, and in the colouring of the anthers and pollen, as well as the cup and throat of the perianth. The most distinctive variation is the difference in the colouring of the anthers and pollen. This feature has therefore been used to divide the species into two varieties. Unfortunately it is sometimes not possible to identify the varieties in herbarium specimens, such as *Marloth 12795* (PRE), from the top of the Hantamberg, Calvinia district.

KEY TO VARIETIES

Anthers dark coloured with reddish-brown or orange pollen a. Var. *tetragona*
Anthers and pollen yellow b. Var. *flavandra*

a. Var. **tetragona**

R. tetragona De Vos 1952c t.1136.

Icon: ibid.; this work Fig. 91.

Perigone segments violet-rose to lilac-pink. *Anthers* purple, incurved or somewhat circinal, with reddish-brown or orange pollen. *Style branches and stigmas* short, recurved, or up to 5 mm long and attenuate. *Chromosome number* 2n = 26 (*de Vos 1934*).

CLANWILLIAM. Sandveld between Grey's Pass and Graafwater: *Leipoldt 3572* (BOL).
CERES. Theronsberg Pass: *de Vos 1569*. Between Karoopoort and Ceres: *Leipoldt BOL 21261*. Gydouw: *Leipoldt 3823* (BOL). Koue Bokkeveld: *Lewis 2632* (SAM).
SUTHERLAND. Plateau 1 ml. N of Komsberg Pass: *de Vos 1934*. Voëlfontein: *Hall 3257* (NBG).

b. Var. **flavandra** De Vos var. nov.

A varietate typica antheris flavis, polline flavo differt.

Holotype: *de Vos 1800B* in STE.

Perigone segments lilac-pink or rarely salmon-pink. *Anthers and pollen* golden-yellow, the anthers usually more erect than in the typical variety or slightly incurved at the tips. *Style branches and stigmas* short (2—3 mm), strongly recurved.

SUTHERLAND. Geelhoek: *Acocks 16986* (PRE, K). 11 mls. S of Sutherland: *de Vos 1936*.
LAINGSBURG. Tweedside: *de Vos 1800B*.
SWELLENDAM. Riviersonderend: *Neethling BOL 24789*.

In the latter collection the upper half of each perianth segment is deep salmon-coloured and the lower half yellow, according to a coloured drawing accompanying the specimens in the Bolus herbarium.

FIG. 91.

R. tetragona (*de Vos* no. 1569). 1, plant ×1. 2, bract ×1,25. 3, bracteole. 4, perianth segment, upper surface ×1. 5, outer segment, lower surface. 6, inner segment, lower surface. 7, pistil, stamens, and part of perianth tube ×3. 8, stamen ×5. 9, transverse section of leaf ×10. (Reproduced from "The Flowering Plants of Africa 1952").

7 Section Bicarinatae De Vos sect. nova

Syn.: Stirps *Speciosae* Béguinot 1909 p. 83 pro parte. Subgen. *Spathalanthus* Baker 1896 p. 37.

Tunicae cormi basi in fibris curvatis acuminatis fissae. *Caulis* brevis. *Bractea* firma concava viridis anguste membranaceo-marginata, plerumque costa media fortiore praedita. *Bracteola* plerumque bicarinata nervis duobus fortioribus praedita, membranaceo-marginata. *Flores* magni, segmentis perigonii basi ad 2—5 mm connatis. *Filamenta* libera praeter in *R. monadelpha* juncta; *antherae* multo longiores quam filamenta, apicibus primo conjunctae.

Type species: *R. sabulosa* Beg.

Corm asymmetrical, rounded at the base; tunics split into slender, bent, acuminate basal teeth or fibres which are usually not grooved on the bend. *Stem* generally short, hidden by sheathing leaf bases. *Leaves* basal, filiform, ca. 1 mm diam., (but in *R. subfistulosa* to 5 mm diam. with rib margins often widened into wings). *Bract* large, firm, concave, green, with narrow membranous margins and mostly a stronger median vein. *Bracteole* mostly 2-keeled, with 2 stronger veins and membranous margins. *Flowers* mostly longer than 30 mm, red, pink or yellow, variously marked with dark blotches in throat. *Perigone segments* fused at the base for 2—5 mm and there forming a shallow saucer-shaped disc or cup, outer segments often with coloured veining on the backs. *Filaments* free (but joined in *R. monadelpha*); anthers much longer than the filaments, at first joined at the tips.

Leaf anatomy. Bifacial and conduplicate in the lower half to more than three-quarters, upper part unifacial, 4-grooved and 4-ribbed or rarely with the rib margins widened into wings (*R. subfistulosa*). Each rib with one large and two or more small vascular bundles, with large sclerenchymatic bundle sheaths against the epidermis, the sclerenchyma forming in *R. sabulosa* and *R. monadelpha* a continuous subepidermal layer. Rib margins with subepidermal fibre bundles and often a small associating vascular strand. Epidermis small-celled and thick-walled in the costal zones, with larger cells against the chlorenchyma, and in the grooves papillose or without papillae. Styloids scattered in the mesophyll, rarely also subepidermal in the ends of the U-shaped parenchymatic bundle sheaths; short crystals sometimes present in the subepidermal layer of the costal zones.

This section consists of four closely allied, highly specialised species, the most beautiful of the South African romuleas. Each species has apparently a limited range on some of the higher inland plateaux of the western Cape Province. The species are readily recognisable by their rigid bracts and bracteoles, large flowers with shallow perigone "tubes", and anthers much longer than the filaments.

The section coincides to some extent with Béguinot's stirps *Speciosae* (1909)

which consists of the three species, *R. sabulosa*, *R. speciosa* and *R. pudica*, the last named species with *R. monadelpha* as one of its synonyms. As there are sufficient grounds to exclude *R. speciosa*, which must be regarded as the type species of the *Speciosae*, as a dubious species (see under Excluded Species), a new section has been established.

Baker (1896) placed *R. monadelpha* in a separate subgenus, *Spathalanthus*, on account of its monadelphous stamens. Hybridisation experiments however, showed the close relationship of this species with *R. sabulosa* (see under Experimental Hybridisation and de Vos 1970a) and indicate that to place *R. monadelpha* in a distinct subgenus would give rise to a very artificial classification. This subgenus has therefore been excluded.

62. **Romulea subfistulosa** De Vos, Ann. Univ. Stellenbosch 28A, 3: 66 (1952a). Icones: l.c. p. 67; this work Fig. 1.

Plants 12—25 cm tall. *Corm* shortly ovoid, 12—20 mm diam., tunics hard, smooth, brown, split into slender acuminate basal fibrils bent towards one side and apical fibrils 10—15 mm long. *Stem* short or sometimes to 90 mm long, hidden by leaf bases underground. *Basal sheaths* usually 2, 20—100 mm long. *Leaves* 4—9, basal, subfistulose, 10—25 cm long, 1,5—5 mm diam., arcuate or sometimes suberect, glabrous, more or less 4-sided with a strong vein in each side and wide grooves on the corners, or 8-angled or 8-winged, leaf bases 5—10 mm wide. *Peduncles* 50—150 mm long, semiterete, reddish-brown to light brown. *Bract* firm, green with narrow membranous margins, concave, ovate to narrowly ovate, 16—25 mm long, 10—13 mm wide, with closely spaced veins and often a stronger median vein in the upper half, subacute to obtuse. *Bracteole* subequal to the bract or to 5 mm longer, mostly 2-keeled and with 2 stouter veins, with a green median zone and white membranous margins minutely speckled and narrowing upwards, tip membranous. *Flowers* 1—5, 30—60 mm long. *Perigone tube* campanulate, 3—5,5 mm long; *segments* obovate to narrowly obovate, recurved, 25—50 mm long, 10—17 mm wide, subacute to obtuse, sometimes slightly apiculate, shiny carmine-rose (RHS 55A), with reddish-black blotches in the throat, cup yellow with a dark median line from each segment; outer segments on the backs with 5—7 reddish-brown or yellowish longitudinal veins and fine feathered veining in between, inner segments rose on backs with yellowish tips. *Stamens* erect, free, inserted near base of perigone; *filaments* free, 4—6 mm long, pilose at base, purple or black-purple or yellow; *anthers* 8—11 mm long, at first joined at tips, bright yellow. *Style* 9—12 mm long; *stigmas* cream-coloured, reaching halfway up anthers or slightly higher. *Capsules* obovoid or subglobose, to 10 mm long, on patent, recurved peduncles which later straighten. *Chromosome number* $2n = 26$ (*STE 30240*).



FIG. 92.

R. viridibracteata (*de Vos* no. *1668*). 1, plant ×1. 2, outer and inner perianth segments, upper surfaces. 3, outer segment, lower surface. 4, bract and bracteole ×1. 5, pistil, stamens, and perianth tube. 6, ripening capsule ×1. 7, transverse section of leaf.

Holotype: *Joubert & de Vos 1585* in STE.

CALVINIA. 15 mls. S of Middelpos towards Gannaggas: *de Vos 2192*.
SUTHERLAND. Waterkloof: *Marloth 9658* (PRE, STE, B). Towards Waterkloof: *Joubert STE 30240*. Near Sutherland: *Joubert & de Vos 1585*, *Joubert STE 30239*, *27166*. 40 mls. NW of Sutherland: *Hall 200* (NBG).

Flowering period August to October.

On stony ground of the Great Roggeveld plateau.

This species is allied to *R. sabulosa*, differing in its wide, almost fistulose leaves with wide stomatiferous grooves, the margins of which are widened to form eight angles or wings, and also in the colouring and markings of the perianth.

Herbarium specimens of this species may be confused with *R. atrandra* which often has pink flowers and wide leaves. *R. subfistulosa* differs from the latter in leaf structure, in the bract and bracteole which have one or two stronger veins and membranous margins narrowing suddenly to very small scarious tips, in the peduncle which does not coil up when the capsule dries out, and in chromosome number.

The leaf structure is influenced somewhat by the environment. In humid localities the leaves are wide and 8-winged, with very wide grooves. The length of the stem depends on the depth of the corm underground. When it is deep underground, the stem may elongate to 90 mm, but it remains hidden by the sheathing leaf bases.

63. **Romulea viridibracteata** De Vos sp. nov.

Fig. 80, 92.

Cormus subglobosus 7—15 mm diam., tunicis rigidis laevibus brunneis, in fibris basalibus longis ad unum latus acute curvatis et apice fibris 5—8 mm longis fissis. *Caulis* brevis, vaginis foliorum obtectus. *Vaginae basilares* plerumque 2. *Folia* 3—5 basilaria filiformia 10—25 cm longa, 0,8—2 mm diam., curvata vel suberecta sulco adaxiali per dimidium ad plus quam $\frac{3}{4}$ longitudinis folii aperto, sulcis angustis vel latis, basibus vaginantibus 3—4 mm latis. *Pedunculi* 30—100 mm longi suberecti, subteretes, plerumque rubiginosi. *Bractea* firma viridis marginibus membranaceis angustis atro-brunneis vel brunneo-punctatis vel interdum fere incoloratis, anguste ovata concava 17—30 mm longa subacuta vel obtusa, nervis prominentibus approximatis et saepe costa fortiore in dimidio superiore, $\frac{3}{4}$ longitudinis perigonii attingens vel altior. *Bracteola* plerumque paulo longior et angustior quam bractea, plerumque bicarinata nervis duobus fortioribus, viridis, marginibus membranaceis angustis albis vel brunneo-punctatis. *Flores* 1—4, 25—40 mm longi, plus minusve campanulati. *Segmenta perigonii* basibus ad 2—4 mm connatis patelliformibus, anguste ovata vel segmentis exterioribus saepe anguste ellipticis, 20—35 mm

longa, 6—10 mm lata, recurvata, acuta vel acuminata, aurea vel ochracea, in fauce maculis purpureo-brunneis vel atris, elongatis vel tridentatis notata; segmenta exteriora a dorso brunnea vel e purpureo brunnea, aliquando leviter nervata. *Stamina* erecta, basi perigonii inserta, lutea; *filamenta* 4—5 mm longa, basi dilatata et pilosa; *antherae* 6—9 mm longae, primo apicibus conjuctae. *Stylus* 8—10 mm longus, stigmatibus dimidium vel apices antherarum attingentibus, luteis. *Capsulae* ad 15 mm longae breviter cylindraceae, in pedunculis post anthesin patentibus demum suberectis, bracteis bracteolisque persistentibus inclusae.

Holotype: *Salter 3652* in BOL. Isotypes in BM, K.

Plant 10—30 cm tall. *Corm* subglobose, 7—15 mm diam., the tunics hard, smooth, brown, split into long basal fibres sharply bent towards one side, and apical fibres 5—8 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* usually 2, 10—35 mm long. *Leaves* 3—5, basal, filiform, 10—25 cm long, 0,8—2 mm diam., curved or suberect, with the adaxial groove open for half to more than three-quarters of the leaf length, grooves narrow or wide, leaf bases 3—4 mm wide. *Peduncles* 30—100 mm long, subterete, mostly reddish-brown. *Bract* firm, green with narrow, dark brown, brown-dotted or sometimes almost colourless membranous margins, narrowly ovate, concave, 17—30 mm long, subacute to obtuse, with prominent closely-spaced veins and often a stouter median vein in the upper half, usually reaching three-quarters up the perigone or higher. *Bracteole* often slightly longer and narrower than the bract, often 2-keeled with two stouter veins, green with narrow, colourless or brown-dotted membranous margins. *Flowers* 1—4, 25—40 mm long, almost campanulate. *Perigone segments* narrowly obovate or outer segments often narrowly elliptical 20—35 mm long, 6—10 mm wide, recurved, acute or acuminate, buttercup-yellow or ochre-yellow (RHS 14B), each claw with a purplish-brown or black, elongated or tridentate mark, with their bases fused for 2—4 mm and forming a shallow saucer-shaped disc; outer segments on the backs brown or purplish-brown and sometimes faintly veined. *Stamens* erect, inserted in the base of the perigone, yellow; *filaments* free, 4—5 mm long, pilose and widened at the base; *anthers* 6—9 mm long, at first joined at the tips. *Style* 8—10 mm long; *stigmas* reaching halfway up the anthers or to their tips, yellow. *Capsules* shortly cylindrical, up to 15 mm long on peduncles at first patent, later suberect, enclosed by persistent bracts and bracteoles. *Chromosome number* $2n = 26$ (*de Vos 1920*).

CALVINIA. Nieuwoudtville: *Leipoldt 4423* (BOL).
CLANWILLIAM. Summit of Pakhuis Pass: *Salter 3652* (BOL, BM, K), *de Vos 1668* and *1920*. Pakhuis: *Leipoldt 483* (GRA).

Flowering period August to September.

This species is closely allied to *R. sabulosa* and is distinguished from the latter by its yellow, slightly smaller flowers with narrower perianth segments which are marked differently in the throat.

The flower resembles that of *R. luteoflora* and of *R. montana*, but the species is readily distinguished from these by its firmer bract and two-keeled bracteole, the latter with narrower membranous margins and a smaller membranous tip. It further has a shorter, shallower perianth tube, and the peduncle does not coil up when the fruit dries out. It differs from *R. montana* furthermore in the curved teeth at the base of the corm.

64. **Romulea sabulosa** Schltr. ex Béguinot, Bot. Jb. 38: 334 (1907a) excl. syn., et 1907b p. 108 et p. 473 et 1908a p. 159 et 1909 p. 84 pro parte excl. syn.; de Vos 1965 p. 139, 1970d t.1612.

Icones: S. Afr. Gardening & Country Life 18: 341 (1928); Flow. Pl. Afr. t.1612 (1970); this work Fig. 79, 93.

Plants 12—40 cm tall. *Corm* subglobose or ovoid, 8—15 mm diam., outer tunics hard, smooth, brown, split at the base into long acuminate teeth or fibres bent towards one side, and apical fibres 5—8 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* usually 2, 15—50 mm long. *Leaves* 3—5, basal, filiform, 10—40 cm long, ca. 1 mm diam., suberect or slightly curved, with the adaxial groove open for half to more than three-quarters of the leaf length, grooves narrow, leaf bases 3—5 mm wide. *Peduncles* 40—140 mm long, subterete, olive to reddish-brown, to 2 mm diam. *Bract* firm, green, with narrow, usually brown, membranous margins, ovate to narrowly ovate, concave, 20—35 mm long, 10—18 mm wide, with prominent, closely spaced veins and frequently a stronger median vein, acute to obtuse, sometimes acuminate. *Bracteole* slightly narrower and often longer than the bract, two-keeled, with 2 stouter veins, green with membranous margins colourless towards the base and usually brown in upper half. *Flowers* 1—4, 30—50 mm or sometimes up to 65 mm long, more or less campanulate. *Perigone segments* subequal or the inner sometimes narrower, subrhomboid-cuneate to obovate-cuneate, 25—40 mm or up to 55 mm long, 12—20 mm or to 25 mm wide, recurved, acute or apiculate or sometimes obtuse, shiny scarlet or currant-red (RHS 43A, 48A, B), each claw with a median elongated brownish-black blotch surrounded by a greyish-green, brownish or sometimes purplish-blue area and below that a yellow V-shaped blotch, the bases fused for 2—4 mm and forming a shallow saucer-shaped disc with a white 6-pointed mark; outer segments with 5—7 yellow veins and fine feathered veining in between, inner segments with a fine yellow median vein. *Stamens* erect, inserted in base of perigone; *filaments* free, 3—5 mm long, glabrous to glabrescent or with some soft hairs at the widened bases, cream or dark-coloured; *anthers* 8—12 mm long, at first joined at the tips, purplish or

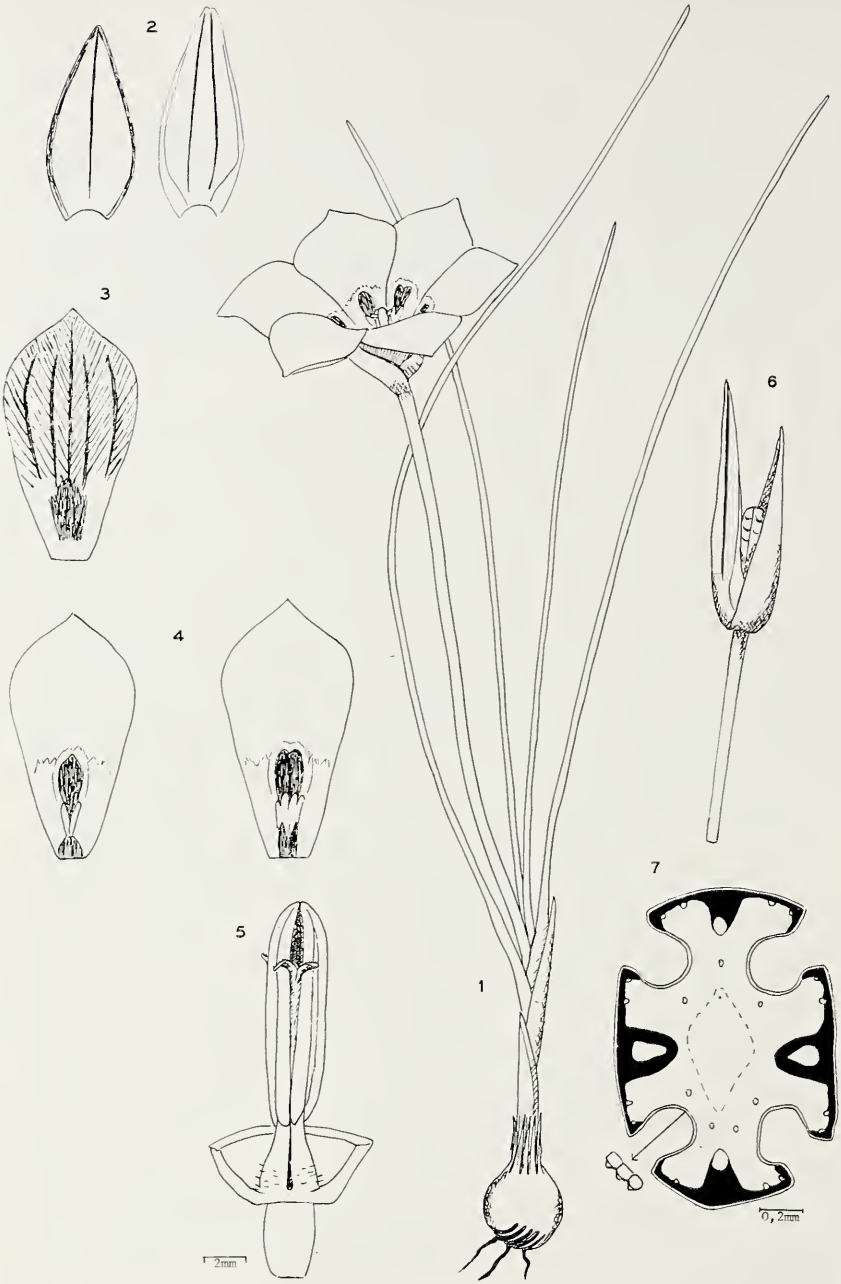


FIG. 93.

R. sabulosa (*de Vos* no. *2024*). 1, plant ×7/8. 2, bract and bracteole ×1. 3, outer perianth segment, lower surface. 4, inner and outer perianth segments, upper surfaces. 5, pistil, stamens, and perianth tube. 6, almost mature capsule ×1. 7, transverse section of leaf.

yellow, with golden-yellow pollen. *Style* 7—12 mm long; *stigmas* cream-coloured, reaching halfway up the *anthers*. *Capsules* 15—20 mm long, cylindrical or narrowly obovoid, on suberect peduncles, enclosed by persistent bracts and bracteoles. *Chromosome number* 2n = 26 (*de Vos 1604*).

Lectotype: *Schlechter 10964* in G. Isotypes in BOL, GRA, PRE, and in many European herbaria, e.g. B, BM, K, S, Z.

CALVINIA. *Buhr NBG 823/30* in K, *NBG 1470/37*, *Burger STE 30206* partly. Oorlogskloof: *Schlechter 10964*. Near Niewoudtville: *de Vos 1604*. Between Oorlogskloof and Papkuilsfontein: *Leipoldt 3053* (BOL). Between Nieuwoudtville and Oorlogskloof: *Leipoldt 3822* (BOL), *Malan STE 30205*, *Lewis SAM 60231* in K. 5 miles from Nieuwoudtville on Oorlogskloof road: *Barker 6534* (NBG). 3 miles from Nieuwoudtville on road to VanRhyns Pass: *Barker 6473* (NBG). Bokkeveld: *Marloth 5566* (PRE). Near Grasberg: *Lewis 5831* (NBG), *de Vos 2024*. Klipkoppies: *BOL 19843*, *Lewis 5864* (NBG). Glen Lyon: *Acocks 19022* (PRE, STE). Ex hort. *van Zyl BOL 24351*.

WITHOUT LOCALITY. Ex Hb. *Forsyth* (partly in K).

Marloth 7492 in PRE has a locality label of Mossel Bay, which is a mistake.

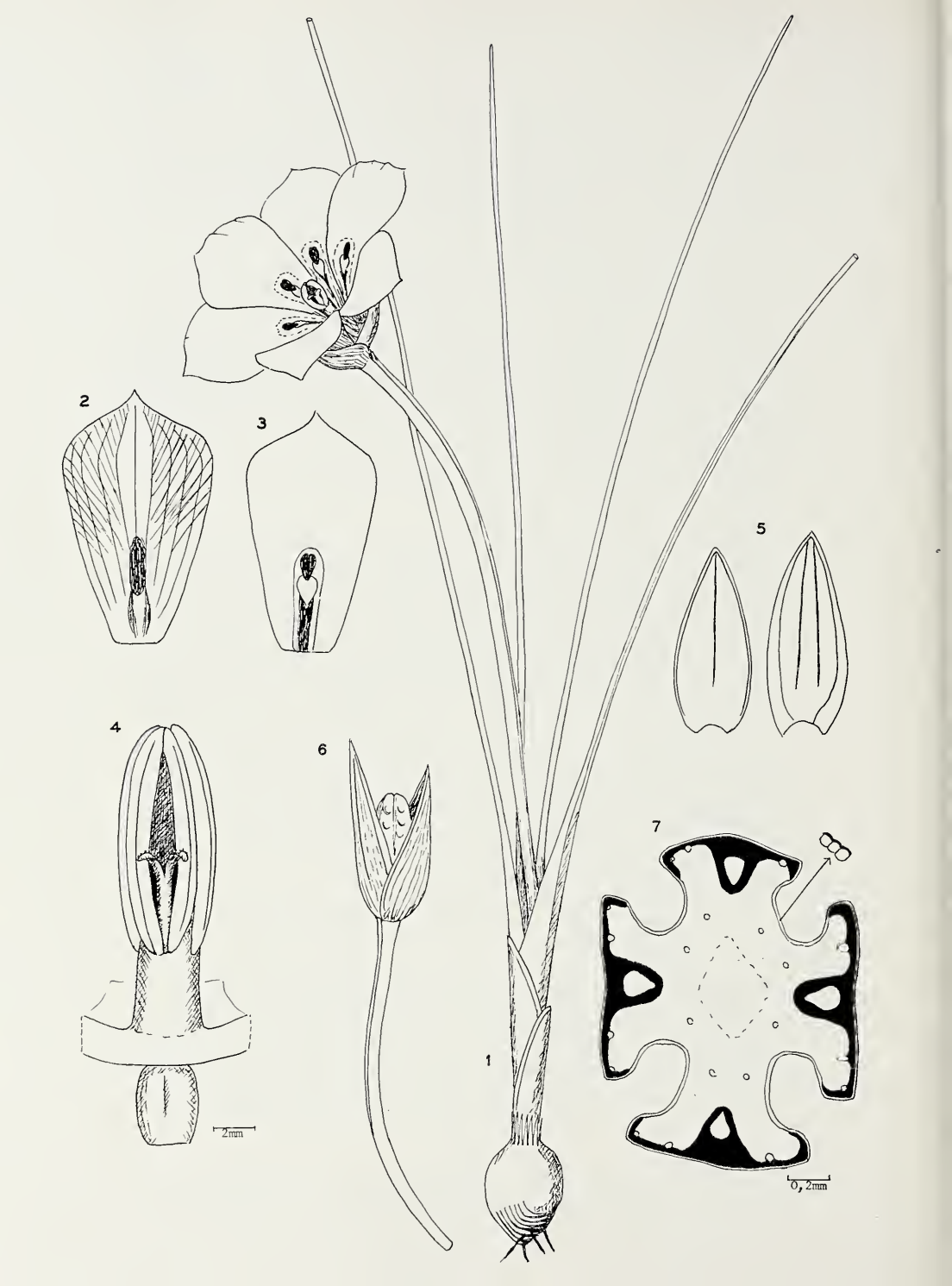
Flowering period July to September.

This species and the sympatric *R. monadelpha*, are known as "satynblom" or "syblom" and are readily distinguished by their shiny-red, more or less campanulate flowers, their large, rigid, green bracts and two-keeled bracteoles. The perianth segments are wide, with the broadest part very near the tips. In the lower half the segments of both species show almost similar markings, viz. a median spear-shaped black and yellow mark on a greyish-brown or greenish-yellow background in *R. sabulosa*, or on a bluish or purplish-grey background in *R. monadelpha*.

R. sabulosa is distinguished from *R. monadelpha* by its free filaments, subterete peduncles, almost straight anthers, and epidermal papillae in the grooves of the leaves. From *R. amoena*, another species with red flowers in the Nieuwoudtville area, it is distinguished by its rounded corm, and from *R. atrandra* and *R. subfistulosa* by its slender filiform leaves, red flowers, and peduncles which remain suberect in fruiting specimens.

Some specimens from Klipkoppies, e.g. *Lewis 5864*, are larger, with leaves up to 50 cm long and 1,5 mm in diameter and perianth segments up to 25 mm wide with obtuse or apiculate tips.

Béguinot (1907a, 1909) cited as synonyms *Trichonema pudicum* Klatt (1865–66) non Ker, and *R. pudica* Klatt (1882) pro parte. The collection of *Bergius* s.n. in B from the "Olifantsrivier prope Kleen William", which Klatt cited under *T. pudicum* and which Béguinot cited under *R. sabulosa*, could no longer be found in B and was probably destroyed during the last war. The above-mentioned locality record for this collection makes it a very doubtful *R. sabulosa*. *T. pudicum* Klatt and *R. pudica* Klatt as synonyms are therefore doubtful.


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65. **Romulea monadelpha** (Sweet) Baker, Handb. Irid. 104 (1892) et 1896 p. 43; Klatt 1895 p. 165; Béguinot 1909 p. 83 pro syn.; de Vos 1970a p. 1.

Spatalanthus speciosus Sweet 1829 t.300 et 1837 t.300 et 1839 p. 668 et 1854 t.171; Baker 1877 p. 104 et 1892 l.c. pro syn. et 1896 l.c. pro syn.; Béguinot 1909 l.c. pro syn.

Trichonema monadelphum Sweet 1830 p. 399; Baker 1896 l.c. pro syn.; Béguinot 1909 l.c. pro syn.

Icones: Brit. Fl. Gard. t.300 (1829, 1837); Loudon, t.22; Ornam. Fl. Gard. 3 t.171 (1854); Jl. S. Afr. Bot. 36: 2,4 (1970a); Veld and Flora 1:37 (1971); this work Fig. 81, 94.

Plants 20—30 cm tall. *Corm* subglobose or ovoid, 8—15 mm diam.; outer tunics hard, smooth, brown, split into long acuminate basal fibres bent towards one side, and apical fibres 5 mm long. *Stem* short, hidden by leaf bases. *Basal sheaths* usually 2, 10—40 mm long. *Leaves* usually 3—5, basal, filiform, 10—30 cm long, ca. 1 mm diam., suberect or curved, with the adaxial groove open for half to more than three-quarters of the leaf length, with a prominent vein in each rib, grooves narrow, leaf bases 4—5 mm wide. *Peduncles* 40—100 mm long, semiterete, olive to reddish-brown, 2 mm diam. *Bract* firm, green, with narrow, usually brown, membranous margins, ovate to narrowly ovate, concave, 20—30 mm long, acute to obtuse, with prominent, closely spaced veins and a stronger median vein in upper half. *Bracteole* narrower and frequently slightly longer than the bract, two-keeled with two stouter veins, green with membranous margins which are colourless near the base and usually brown in the upper half. *Flowers* 1—4, 30—45 mm or to 55 mm long, campanulate. *Perigone segments* subequal or the inner slightly narrower, subrhomboid-cuneate to obovate-cuneate, 25—40 mm or up to 45 mm long, 12—25 mm wide, recurved, acute or apiculate, shiny, deep claret-red (RHS 46B, C), each claw with a median, spear-shaped black blotch surrounded by a blue or purplish-grey or sometimes pale yellow area and below that a small yellow blotch which fades on drying, with the bases fused for 2—3 mm and forming a shallow saucer-shaped disc with a 6-pointed white mark; outer segments on the backs with 7—9 yellow veins and fine feathered veining in between, inner with fine yellow veins at the tips. *Stamens* monadelphous, inserted in base of perigone; *filaments* 3—4 mm, forming a short, shiny-black tube; *anthers* often curved, 10—15 mm long, free but at first joined at their tips, purplish or yellow, with golden-yellow pollen. *Style* 8—12 mm long; *stigmas* cream-coloured reaching halfway to three-quarters up the anthers. *Capsules* 10—15 mm long, shortly cylindrical or obovoid, on curved peduncles, enclosed by persistent bracts and bracteoles. *Chromosome number* 2n = 26 (*de Vos 1926*, *1991*).

Iconotype: Sweet, Brit. Flow. Gard. t.300 (1829, 1837).

FIG. 94.

R. monadelpha (*de Vos* no. *1991*). 1, plant ×⅞. 2, outer perianth segment, lower surface. 3, inner segment, upper surface. 4, pistil, stamens, and perianth base. 5, bract and bracteole. 6, almost mature capsule ×1. 7, transverse section of leaf.

CALVINIA. About 3 mls. from Nieuwoudtville towards Calvinia: *de Vos 1926*, *1991*, *2089*. Near Nieuwoudtville: *Burger STE 30206* partly. 10 mls. from Calvinia on road to Nieuwoudtville: *Hardy 64* (PRE). Akkerdam, foot of Hantam Mts.: *Middlemost 2160* (NBG). 30 mls. E of Nieuwoudtville: *Goldblatt 260* (BOL).

Marloth 7492a in PRE has a locality label of Mossel Bay, which is incorrect.

Flowering period end of July to September.

This is one of the rarest and most beautiful of romuleas and the only species with the filaments joined to form a short tube round the style and bearing the free anthers on the upper margin of the tube. Until its rediscovery in 1964 (de Vos 1970a), it was known only from Sweet's coloured drawing and description of it which he had made after its introduction into Britain in 1825. Sweet placed it in a separate genus *Spatalanthus*, on account of its united filaments and the "three flat ligulate stigmas forked at their points". Baker (1892), however, realising that its stigmas were typical of many *Romulea* species, transferred it to the genus Romulea, notwithstanding its joined filaments.

Specimens of *R. monadelpha* from their natural habitat differ from Sweet's figure in their more compact, campanulate flowers with shorter, wider perianth segments. The long segments figured by Sweet probably developed as a result of less intense light in Britain.

R. monadelpha is very closely allied to *R. sabulosa* and can be mistaken for it after a superficial examination. A detailed examination of all the herbarium material of *R. sabulosa* produced several specimens of *R. monadelpha*. The two species have the same chromosome number and the structure of the leaves and corm is similar. *R. monadelpha* is, however, not only distinguished by its glabrous, shiny-black filament tube, but also by its semiterete peduncles which bend after flowering, by a slightly more brilliant red perianth with slightly different markings in the throat, by its often curved anthers, and by an absence of papillae in the grooves of the leaves (de Vos 1970a).

Béguinot (1909) cited *R. monadelpha* as a synonym of *R. pudica* Baker. This view cannot be upheld, as the coloured figures on which the two species are based are different.

66. **Romulea** ×**vanzyliae** De Vos hybr. nova.

R. subfistulosa De Vos 1952a p. 66 pro parte.

Icon: an unpublished coloured drawing in BOL.

Hybrida putativa foliis ad 3 mm latis, sulcis latis ut in *R. subfistulosa*, floribus rubentibus in fauce maculatis ut in *R. sabulosa*, inter alia distinguitur.

Holotype: *BOL 24349* in BOL. Isotype in PRE.

CALVINIA. In damp ground in vlei: *Schmidt 341* (PRE).
WITHOUT LOCALITY. Cultivated in Mrs. van Zyl's garden: *BOL 24349*.

The two specimens cited seem to stand between *R. subfistulosa* and *R. sabulosa* and are treated as putative hybrids until more material is obtained for exam-

ination. They have wide leaves with wide grooves as in *R. subfistulosa* and flower colouring and markings as in *R. sabulosa:* the perianth segments are pinkish-red with a dark blotch on each claw, surrounded by a pale violet zone, and below that a yellow blotch. The stamens have dark filaments.

Both collections were cited under *R. subfistulosa* with a note that they differ from this species in flower colour and markings on the perianth (de Vos 1952a).

SUBGENUS LOMUREA De Vos subgen. nov.

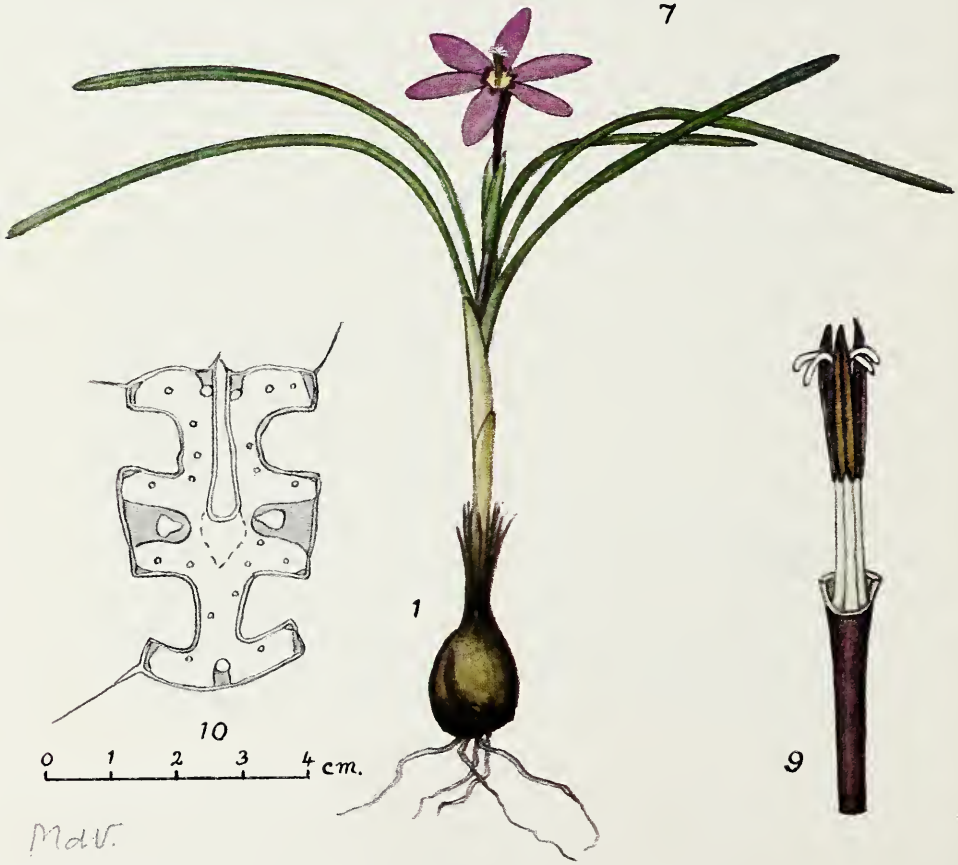
Cormus basi rotundatus vel acutus vel oblique complanatus crista lunata praeditus. *Caulis* brevis. *Folia* plura (vel 1) basilaria filiformia vel compresso-cylindrica 4-sulcata. *Flores* hypocrateriformes. *Tubus perigonii* 11—70 mm longus anguste tubularis, sursum dilatatus longior quam segmenta; *segmenta* patentissima, plerumque anguste elliptica obtusa rosea vel magentea vel pallide violacea, varie notata. *Stamina* erecta exserta sub fauce perigonii inserta; *filamenta* glabra.

Type species: *R. syringodeoflora* De Vos.

Corm rounded or pointed at the base, with tunics split into bent or almost straight teeth at the base, or obliquely flattened towards the base with a crescent-shaped basal ridge. *Stem* short, hidden by leaf bases. *Leaves* one to several, basal, filiform or compressed-cylindrical, 4-grooved. *Peduncles* short, hidden or shortly extending from the leaf bases. *Flowers* salver-shaped. *Perigone tube* 11—70 mm long, narrowly tubular, widening towards the top, longer than the segments; *segments* widely patent, generally narrowly elliptical, obtuse, up to 15 mm long, rose, magenta or pale violet, variously marked. *Stamens* erect, inserted in the upper part of the perigone tube; *filaments* glabrous. *Capsules* produced just above ground level.

The three species comprising this subgenus are morphologically intermediate between *Romulea* and *Syringodea*, resembling the latter in the shape of their perianths. Three corm types, with smooth woody tunics, occur here, belonging to the ciliata, rosea, and cruciata corm types of *Romulea*. The leaves have the typical 4-grooved, largely unifacial leaf blades of *Romulea*, and in anatomical details they are identical with romulean leaves which are associated with the above-mentioned corm types. The subgenus further resembles *Romulea* in its bifid style branches and ovaries which, after anthesis, do not elongate at their bases as so often happens in *Syringodea*. The somewhat elongated peduncles bearing the flowers at or above ground level are also not typical of *Syringodea*.

The shape of the perianth in this subgenus is very distinctive and this feature might perhaps be considered sufficient to justify the subgenus being made a distinct genus. As the three species, however, conform in all other features with *Romulea*, they are retained in this genus and the description of the genus has been amplified to include them.


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The three species of *Lomurea* are local endemics, each with a very restricted area in the inland districts of Clanwilliam, Calvinia, and Sutherland respectively.

It seems advisable to divide the subgenus into two sections, as one of its species, *R. stellata*, differs considerably from the other two. This has a ciliata corm type and one, or sometimes two, very slender filiform, for the most part conduplicate leaves with only the tips unifacial, resembling the leaves of *R. tortuosa* in anatomical structure. The other species have a rosea and a cruciata corm type respectively, and numerous leaves which are conduplicate in the lower half and unifacial in the upper half, and resemble the leaves of those sections of *Romulea* possessing such corm types.

8 Section Lomurea

Corm rounded or pointed at the base, with tunics split at the base into acuminate, bent or almost straight, ungrooved teeth. *Leaves* several, compressed-cylindrical, arcuate. *Bract* and *bracteole* largely green. *Flowers* salver-shaped. *Perigone tube* 15—50 mm long, narrowly tubular, widening at the top; *segments* widely patent, ca. 10—15 mm long, rose or magenta. *Style* 22—65 mm long; *ovary* borne at or just above ground level. *Capsules* shortly cylindrical.

Type species: *R. syringodeoflora* De Vos.

Leaf anatomy. Upper half unifacial, 4-grooved and-4-ribbed. Each rib with a large and 2—4 small vascular bundles with large sclerenchymatic sheaths against the epidermis. Rib margins glabrous or minutely ciliate, with subepidermal fibre bundles, and in *R. syringodeoflora* with an associating vascular strand also. Epidermis on the ribs somewhat small-celled and in the grooves with high papillae. Short subepidermal crystals in the costal zones.

The two species in this section differ in corm shape, the length of their perianth tubes and styles, and in the markings on the perianth segments. In general habit and flower shape they are very similar. The shape of the perianth resembles that of the genus *Syringodea*, but in all other features the species are typical romuleas (see under subgenus *Lomurea* for further discussion).

67. **Romulea syringodeoflora** De Vos, Ann. Univ. Stellenbosch 28A, 3: 74 (1952a) et 1965 p. 139.

Icones: de Vos 1952a Fig. 6; this work Fig. 95.

Plants 12—20 cm tall. *Corm* subglobose or ovoid, 10—15 mm diam., tunics somewhat hard, smooth, brown, with slender acuminate basal teeth usually bent towards one side, and apical fibres 8—25 mm long. *Stem* 20—70 mm long, hidden by the leaf bases. *Basal sheaths* 2—3, sometimes 1, 25—75 mm long. *Leaves* 5 or more, basal, compressed cylindrical, arcuate or recurved, 12—20 cm long,

Fig. 95.

R. syringodeoflora (*de Vos* no. *1583*). 1, plant ×1. 2, bract. 3, bracteole. 4, perianth segment, upper surface. 5, 6, outer and inner segments, lower surfaces. 7, longitudinal section through flower ×2. 8, stigmas ×5. 9, stigmas, stamens, and perianth tube ×4. 10, transverse section of leaf ×30.



FIG. 96.
R. hantamensis (*Diels* no. *732*, *Goldblatt* no. *276*). 1, plant ×1. 2, outer perianth segments, upper and lower surfaces. 3, bract and bracteole ×1. 4, pistil, stamens, and perianth tube. 5, transverse section of leaf.

1—2,5 mm diam., 4-ribbed with a strong vein in the lateral ribs, rib margins ciliate or glabrescent, grooves wide, sheathing leaf bases 3—4 mm wide. *Peduncles* 20—40 mm long, almost semiterete, hidden or extending up to 25 mm from the leaf sheaths, suberect, later curved, narrow at the bases. *Bract* green with very narrow, white membranous margins and tip, narrowly ovate, finely striate, 15—20 mm long, reaching halfway or higher up the perigone, acute or obtuse. *Bracteole* with wider, white membranous margins and a membranous, obtuse or irregularly lacerated tip. *Flowers* 1—3 or more, 30—40 mm long, salver-shaped. *Perigone tube* 15—22 mm long, narrowly tubular for three-quarters of its length, widening at the top, dark red outside; *segments* narrowly elliptical or narrowly obovate, widely patent, obtuse, 10—17 mm long, 3—5 mm wide, magenta-pink, with a dark red, V-shaped mark near the base of each, the outer segments on the backs dark red and yellow striped, and slightly larger than the inner. *Stamens* erect, exserted, inserted in the perigone tube where it widens; *filaments* 4,5—5 mm long, glabrous, off-white; *anthers* 4—6 mm long, purple, with yellow, orange or rust-coloured pollen. *Style* 22—30 mm long; *stigmas* ca. 2 mm long, reaching below to above the anther tips, white or mauve. *Capsule* not seen. *Chromosome number* 2n = 20 (*de Vos 1583*).

Holotype: *de Vos 1583* in STE.

SUTHERLAND. Roggeveld, top of Verlatekloof, farm Jakhalsvallei: *Marloth 9644* (STE, PRE, B). Helfte: *Joubert STE 27156*. Flats near Sutherland: *Joubert STE 27159*, *de Vos 1583*, *2059*. Theronsrust, 20 mls. S of Sutherland: *Acocks 17797* (PRE, K).

Flowering period September to October.

This species has been found only on the plateau around Sutherland and towards the edge of the Roggeveld plateau. It is readily distinguished by its salver-shaped flowers with widely spreading, obtuse, magenta-pink perianth segments and long, narrow perianth tube which is longer than the segments. It differs from *R. hantamensis* mainly in its shorter perianth tube, shorter style, bract, and bracteole, V-shaped marks at the bases of the perianth segments, corm with bent basal teeth, and in its chromosome number. It is not closely related to the long-tubed *R. macowanii* and *R. kamisensis*.

It differs from the genus *Syringodea* which often has a similarly shaped perianth, mainly in its bifid style branches, peduncled spathes, and in leaf structure.

68. **Romulea hantamensis** (Diels) Goldblatt, Flow. Pl. Afr. t.1613 (1970).

Lapeirousia hantamensis Diels 1910 p. 116—holotype: *Diels 732* (B).

Icon: Flow. Pl. Afr. t.1613 (1970); this work Fig. 96.

Plant 7—15 cm tall. *Corm* pointed at the base, 8—15 mm diam., tunics hard, smooth, brown, with acuminate, straight or sometimes slightly bent teeth con-

verging to the basal point, and apical fibres ca. 5—10 mm long. *Stem* short and hidden by the leaf bases. Basal sheaths usually 2, 10—30 mm long. *Leaves* several, basal, compressed-cylindrical arcuate or recurved, 7—15 cm long, 1—1,5 mm diam., 4-ribbed, glabrous, with rather narrow grooves and sheathing leaf bases up to 6 mm wide. *Peduncles* short or up to 40 mm long, hidden or slightly extending from the leaf sheaths, suberect. *Bract* green but violet toward the base or in the lower half, with narrow membranous margins, narrowly triangular, 28—35 mm long, ensheathing the lower part of the perigone tube. *Bracteole* with wider, white or brown-speckled membranous margins. *Flowers* 2—5, ca. 60—75 mm long, salver-shaped. *Perigone tube* 35—70 mm long, narrowly tubular for most of its length, widening at the top; *segments* narrowly elliptical, widely patent, obtuse, 10—14 mm long, 3—5 mm wide, bright magenta with a purplish-black blotch above the middle and below that a white blotch with 3 dark lines on each segment, outer segments yellowish-green with purple stripes on the backs. *Stamens* erect, exserted, inserted in the perigone tube where it widens; *filaments* 3 mm long glabrous, purple; *anthers* 3—5 mm long, purple-striped, with yellowish pollen. *Style* 60—65 mm long, slender; *stigmas* reaching to the anther tips or slightly higher. *Capsules* shortly cylindrical 12—15 mm long, borne above ground level on suberect peduncles. *Chromosome number* 2n — 30 (teste Goldblatt 1971.)

Holotype: *Diels 732* in B.

CALVINIA. Plateau on top of western Hantam mountains: *Diels 732*. Hantamberg plateau: *Goldblatt 276*, (BOL), *429* (PRE).

This rare species apparently has a very local range on somewhat moist, loamy ground, at an altitude of 1 500 metres on the Hantam mountain, where it was collected in 1900 and again in 1968.

When examining the Iridaceae in the Berlin-Dahlem herbarium in 1965, Dr G. J. Lewis came across the type of this species amongst the *Lapeirousia* species. She suggested (private communication) that it should be transferred to *Romulea*. The leaf structure, corm shape, and type of inflorescence are typical of *Romulea*, and only the shape of the perianth and markings on the perianth segments resemble *Lapeirousia*.

R. hantamensis is readily distinguished by its salver-shaped perianth with magenta-pink, widely spreading segments, exserted stamens, and long slender perianth tube which is about twice as long as in *R. syringodeoflora*. The corm with its straight or almost straight basal teeth converging to a basal point also distinguishes this species from *R. syringodeoflora*. The leaf structure of the two species differs in minor details only: in *R. hantamensis* the leaf ribs have more vascular strands and the fibre strands on the rib margins are larger and are without vascular strands.

9 Section Stellanthe De Vos sect. nov.

Cormus basi oblique complanatus crista lunata praeditus. *Folia* 1 vel interdum 2 filiformia minus quam 1 mm diam., conduplicata praeter apices unifaciales 10—20 mm longos. *Bractea et bracteola* submembranaceae, in partibus superioribus viridulae. *Flores* hypocrateriformes. *Tubus perigonii* 11—17 mm longus perangustus; *segmenta* patentissima pallide purpurea vel pallide violacea. *Stylus* 15—20 mm longus. *Capsulae* ellipsoideae.

Type species: *R. stellata* De Vos.

Corm obliquely flattened towards the base, with a crescent-shaped basal ridge. *Leaves* 1 or sometimes 2, basal, filiform, less than 1 mm diam., conduplicate, but the upper 10—20 mm unifacial. *Bract* and *bracteole* submembranous, greenish in the upper halves. *Flowers* salver-shaped. *Perigone tube* 11—17 mm long, very narrow for most of its length, longer than the segments which are pale purple or pale violet. *Ovary* borne at the ground level; *style* 15—20 mm long. *Capsules* ellipsoid.

Leaf anatomy. Leaf blade 4-grooved and 4-ribbed, conduplicate except for the upper 10—20 mm which is unifacial. Each rib with a single vascular bundle, with a small sclerenchymatic sheath separated from the epidermis by a parenchymatic bundle sheath. Rib margins without sclerenchyma, glabrous. Epidermis large-celled and without papillae. Subepidermal crystals absent.

69. **Romulea stellata** De Vos sp. nov.

Fig. 97.

Cormus 5—10 mm diam., basi oblique complanatus crista lunata ciliolata, tunicis rigidis laevibus brunneis, apice fibris ca. 2 mm longis praedito. *Caulis* 3—10 mm longus vaginis foliorum obtectus. *Vaginae basilares* 2. *Folia* 1—2, basilaria filiformia 10—13 cm longa minus quam 1 mm diam., flexuosa vel suberecta 4-sulcata sulcis angustis, conduplicata praeter apices unifaciales 10—20 mm longos, basibus vaginantibus angustis. *Pedunculi* 5—20 mm longi subteretes, infra terram producti. *Bractea* submembranacea, rubro-brunnea vel viridula in dimidio superiore, anguste triangularis 8—12 mm longa, nervis tenuibus purpurascentibus, subacuta. *Bracteola* marginibus angustis membranaceis. *Flores* 1—2, interdum 3—4, 20—30 mm longi hypocrateriformes. *Tubus perigonii* 11—17 mm longus anguste tubularis 1 mm diam., sursum dilatatus, rubro-brunneus; *segmenta* anguste elliptica 7—11 mm longa 2—4 mm lata, leviter concava, obtusa pallide purpurea vel pallide violacea, fauce violacea, apice tubi flavo intus, segmenta exteriora a dorso purpureo-marmorata. *Stamina* erecta exserta, sub fauce perigonii inserta; *filamenta* 2—3,5 mm longa glabra; *antherae* 2—3 mm longae violaceae, polline pallide violaceo. *Stylus* 15—20 mm longus; *stigmata* 6 vel raro 5, recurva apices antherarum attingentia.



FIG. 97.

R. stellata (*de Vos* no. *2171*). 1, plant ×1,5. 2, outer and inner perianth segments, upper surfaces. 3, outer segment, lower surface. 4, bract and bracteole. 5, pistil, stamens, and perianth tube. 6, ripening capsule ×1,5. 7, mature capsule. 8, transverse section of leaf.

Capsulae breviter ellipsoideae 5—8 mm longae, in pedunculis suberectis vel subcurvatis, supra terram breviter extensis.

Holotype: *de Vos 2171* in STE.

Plants 10—13 cm tall. *Corm* 5—10 mm diam., obliquely flattened towards the base, with a crescent-shaped basal ridge; tunics hard, smooth (or minutely and shallowly pitted), brown, with minute parallel fibrils on the basal ridge, and apical fibrils ca. 2 mm long. *Stem* 3—10 mm long, hidden underground by the leaf bases. *Basal sheaths* 2, 10—30 mm long. *Leaves* 1—2, basal, filiform 10—13 cm long, less than 1 mm diam., flexuose or suberect, conduplicate except for the upper 10—20 mm which is unifacial, 4-grooved, with grooves narrow, sheathing leaf bases narrow. *Peduncles* 5—20 mm long, subterete, produced below ground level. *Bract* submembranous, reddish-brown or greenish in the upper half, colourless below, narrowly triangular, 8—12 mm long, with slender purplish veins, subacute. *Bracteole* with narrow membranous margins. *Flowers* 1—2 or sometimes 3—4, 20—30 mm long, salver-shaped. *Perigone tube* 11—17 mm long, narrowly tubular, 1 mm diam., widening slightly towards the top, brownish-red; *segments* narrowly elliptical, 7—11 mm long, 2—4 mm wide, slightly concave, obtuse, pale purple or pale violet (RHS 78C, 82C), dark violet in the throat and yellow in the top of the tube, outer segments mottled with purple on the backs. *Stamens* erect, exserted, inserted in the top of the perigone tube; *filaments* 2—3,5 mm long, glabrous; *anthers* 2—3 mm long, violet, with pale violet pollen. *Style* 15—20 mm long; *stigmas* 6 or rarely 5, recurved, reaching the anther tips. *Capsules* shortly ellipsoidal, 5—8 mm long, on suberect or slightly bent peduncles shortly extended above-ground.

VANRHYNSDORP. Giftberge: *Oliver* 30.v.65 (NBG).
CLANWILLIAM. S slopes of Pakhuis: *Salter 2452* (BOL). Pakhuis: *Salter 2460* (BOL). Pakhuis beyond summit: *de Vos 2171*.

Flowering period May to July.

In moist shallow soil in shallow depressions on rock layers.

This new species has a very restricted range on the Giftberge and in the Pakhuis pass, and is distinguishable by its one, or sometimes two, very slender, filiform foliage leaves, and small salver-shaped, star-like pale purple or pale violet flower with a long, narrow perianth tube and the base of the flower borne at the level of the soil.

It differs from the other two species of the subgenus *Lomurea* in its corm which has a crescent-shaped basal ridge, in its small number of slender filiform leaves with a different anatomical structure, and in the markings on the perianth segments.

EXCLUDED SPECIES

Ixia bulbocodioides De la Roche 1766 p. 19. The species known until recently as *R. bulbocodioides* (De la R.) Eckl., or Bkr., is not *Ixia bulbocodioides* De la R. According to De la Roche's detailed description of the latter species, the corm is campanulate with a circular basal disc, and this fits *R. triflora*. The description of the leaf, however, fits *R. flava*. As no type has been found for De la Roche's plant, the name is excluded (see also Goldblatt & Barnard 1970).

I. fugax Hornemann 1813 p. 50. This is a later homonym of *I. fugax* Salisb. Baker (1877, 1896) cited it as a synonym of *R. rosea* Eckl., and in this he was followed by Klatt (1895) and Béguinot (1909). But this is not correct, as a romulea in C, labelled "*Ixia fugax* Hornem. . . . ex hort. bot. Hafn." which is probably Hornemann's type, has an elongated stem and is not *R. rosea*; the material is too poor for further identification.

I. fugax Salisbury 1796 p. 34. This is probably a romulea (see also Lewis 1962 p. 179), but the species cannot be determined from the description. No specimen has been seen.

R. barbata Baker 1876 p. 236. The type of this species is Herbert's coloured drawing in the Lindley Library of the Royal Horticultural Society, London, illustrating a plant from the Cape named *Trichonema barbatum* W. Herb. (ined.). It has an elongated stem and lilac-coloured flowers with rather narrow perianth segments and style branches high above the anthers. Baker (1892, 1896) cited it as a synonym of *R. rosea* var. *speciosa*, but it cannot be placed with *R. rosea*, because of its elongated stem. It probably represents a horticultural form which cannot be identified with any known Cape species of Romulea.

R. dielsii Béguinot 1909 p. 96 pro hybr.: *R. hirsuta* × *R. cruciata*. The type *Diels 146* pro parte in B, "mixta cum *R. cruciata* var. *vulgaris*", could not be found and was probably destroyed in the last war. From the description it is not possible to determine what romulea this is. A hybrid between *R. hirsuta* and *R. cruciata* is very unlikely.

R. pudica (Ker) Baker 1877 p. 89; *R. rosea* Eckl. var. *pudica* (Ker) Baker 1896 p. 42; iconotype: Bot. Mag. t.1244 (1810), sub *Trichonema pudicum*. Ker's figure shows a romulea with bright pink flowers and a flat-based, campanulate corm, which was brought from the Cape and flowered in England. It is not the same species as Oldenburg's plant (s.n.) in BM labelled *Ixia pudica* Soland., a nom. nud. which Ker cited as synonym. Oldenburg's plant is *R. flava*. No specimen has been found which fits Ker's figure, the nearest to it being *R. amoena* and *R. hirsuta* var. *framesii*, both of which have flat-based, bell-shaped corms. Ker's plant might be a horticultural form. As it is impossible to determine from the figure what species it is, it is excluded. Béguinot (1909) cited *R. monadelpha*

as a synonym of *R. pudica*, but this is an entirely different species. The collections cited by Klatt under *Trichonema pudicum* (1865–66) and under *R. pudica* (1895) belong to several different species.

R. speciosa (Ker) Baker 1877 p. 89; *R. rosea* Eckl. var. *speciosa* (Ker) Baker 1896 p. 42 pro parte: non Lewis 1950. Icones: Andrews 1801 t.170; Ker 1812 t.1476. Andrews' figure illustrates a romulea from the Cape with an elongated stem, two basal leaves, a corm with a basal ridge, (probably crescent-shaped), and red flowers with purple throats and outer perianth segments showing longitudinal lines and feathered veining on the backs. Ker's figure differs from that of Andrews in having a bright pink flower, a rounded corm, and a single basal leaf. The elongated stem and rounded corm shown in Ker's drawing are two features which generally do not occur together in Cape romuleas, and the Bot. Mag. figure is probably incorrect. Klatt, Baker, and Béguinot applied the name in herbaria to plants belonging to several different species, none of which fits the Bot. Mag. figure. *R. dichotoma* (Thunb.) Bkr. is the species which most nearly fits Andrews' figure. N. E. Brown also suggested this, as notes in his handwriting in the Kew herbarium show. If this surmise is correct, then *R. speciosa* is a synonym of *R. dichotoma*, the latter epithet being the earlier one.

R. spiralis (Burch.) Baker 1877 p. 90 et 1896 p. 40. The holotype, *Burchell 1356* in K, is a species of *Geissorhiza*, namely *G. spiralis* (Burch.) De Vos comb. nov. It stands near *G. corrugata* Klatt, differing from the latter in the possession of slightly larger, purplish flowers, instead of yellow ones. Other collections are *Marloth 10414* (STE, PRE, B) and *de Vos 1584*, both from the type locality near Sutherland.

R. tubata Klatt 1882 p. 401. The holotype, *Drège 2636* in the Lübeck herbarium, was not seen and was probably destroyed in the last war. Other specimens labelled *Drège 2636*, in G, K, P, S, and OXF, have flowers with short perianth tubes and do not fit Klatt's description of *R. tubata* (yellow flowers with a perianth tube more than twice the length of the segments). These specimens are therefore not isotypes. Baker (1892, 1896), having seen only Drège's short-tubed specimens, placed *R. tubata* with *R. rosea* var. *dichotoma* Bkr., and Béguinot (1909) cited it as a synonym of *R. filifolia* Eckl. Neither of these opinions can be accepted.

The only indications I found that there were specimens with long perianth tubes, are two unpublished sketches in S. It is, unfortunately, impossible to determine the species, or even the genus, from these sketches. The elongated stem mentioned by Klatt shows that the species is not *R. macowanii* var. *alticola*.

R. zeyheri Ecklon 1827 p. 19 nom. nud. Ecklon's collection of this species, seen in S, is a *Geissorhiza* and is not the same as *R. zeyheri* Béguinot (1907a, 1909) which is, at least partly, *R. hirsuta* var. *zeyheri*.

Trichonema barbatum W. Herb. ined. See *R. barbata*.

T. humile (Thunb.) Ker 1802 sub t.575. This is *Geissorhiza humilis* (Thunb.) Ker.

T. longitubum Klatt 1865–66 p. 665. According to Béguinot (1909) it is *S. longituba* (Klatt) Kuntze.

T. ornithogaloides (Licht. ex Roem. & Schult.) Dietrich 1839 p. 159. This is *Geissorhiza ornithogaloides* Klatt (see Lewis 1962 p. 191).

T. pudicum Ker 1810 t.1244. See *R. pudica* above.

T. quadrangulum Sweet 1827 p. 399. According to Steudel (1841) this is *Ixia quadrangula* De la R. If this is correct, then it is *Gladiolus quadrangulus* (De la R.) Barnard (see Goldblatt & Barnard 1970).

T. speciosum Ker 1812 t.1476. See *R. speciosa.*

T. spirale Burchell 1822 p. 260. See *R. spiralis.*

T. zeyheri (Eckl.) Steudel 1841 p. 702 nom. nud. See *R. zeyheri* Eckl.

Numbered Exsiccata Examined

ABERTH: Hb. Conrath 610 (58a). ACOCKS: 327 (5); 329 (22); 971 (57a); 1915 (15b); 1916 (13); 1924 (15d); 2043 (13); 2079 (57a); 2152, 2153 (23a & 54d); 2154 (22); 2183 (35a); 2190 (14); 2220 (57b); 2237 (5); 2708, 4457, 4464, 4480, 4481 (15a); 4926 (23a); 5271 (25); 12060 (37); 14294 (34a); 16976 (47a); 16986 (61); 16988 (32a); 17172 (57b); 17173 (52); 17701 (44); 17797 (67); 18211 (32a); 18212 (55); 18224 (3); 18451 (49); 18452 (52); 19022 (64); 19296 (6); 19358 (7b); 19440 (18); 19466 (19); 19781 (14); 20592 (39); 21349 (35a); 21164 (47c & 57c); 21353 (29); 12381 (57c); 21513 (40); 22239 (15a); 22688 (40); 22848A (57c); 23984 (1). ADAMSON: 2609 (54d). ANDRAG: STE 19770 (57b); 19781 (15a). ANDREAE: 577 (15a). ARBUTHNOT: BOL 18719 (14); 20310 (54c); 20315 (13); 20972 (57c); 24778 (54a). ARCHIBALD: 3117 (34a); 4517 (37); 5888, 7317/b, 7350, 7352 (44); RUC Bi. Exp. 212 (34a). AUSTIN: 2572 (31).

BACHMANN: 513 (23b); 627, 646 (15a); 1576 (15a & 1); 1578 (23a); 1579 (23b); 1845, 1856 (15c); 1914, 2016, 2018 (15a); 2158 (13). BAIN: RUH 3256 (21). BARBERS: 74 (34a). BARKER: 121 (57b); 122 (58b); 174 (57a); 190 (28); 261, 269 (57b); 436, 437 (23a); 732 (59); 794, 815 (22); 1800 (23a); 1971 (11); 1972 (29); 1973 (57b); 2346, 2347 (15a); 2522 (25); 2681 (13); 3049 (57b); 3077 (14); 3651, 3676 (18); 3773 (57b); 3839 (59); 3881 (22); 4051 (15b); 4116 (57e); 4542 (57d?); 4763 (14); 4764 (54b); 4794 (57e); 4796 (22); 6360 (15a); 6472 (60); 6473 (64); 6478 (11); 6534 (64); 6591 (4); 6872 (57c); 7180 (57b); 7364 (29); 7391 (28); 7409 (18); 9326 (60); 9457 (35c); 10394 (54d); 10399 (23b); 10631 (40); 10640 (57b); 10648 (59); 10649 (17); 10771 (32a); NBG 273/67 (16). BARNES: BOL: 19470 (47a); 19471 (46). BATTEN: 2P162 (47c). BAYLISS: 1263 (44); 1644 (15b); 1653 (1). BOKELMANN: 1002, 4-P116 (37). BOLUS: 592 (34a); 2239 (47b); 2810, 3696, 3734 (15); 3746 (57d); 3760 (22 & 23c); 4345 (?13); 4596 (23a); 4601 (54a); 5245 (57d); 6619 (18); 6620 (7b); 12836 (13); 12837 (59); 13326 (15a); 13729 (57a); 13941, 13942 (54a); 13943 (13); 17022 (23a); 17186 (22); 19151 (57a); 19205 (15a); 20336 (13); 20519 (11); 20721 (23d); 20725 (54d); 20739 (46); 20834, 21260 (23a); 21262 (59 & 54d); 21263 (54c); 21265 (24); 22451 (57b); 22897 (54c); 23190 (24); 23191 (58b); 24346 (18); 24347, 24348 (58b); 24353 (23a, b); 24780 (59); 24785 (58b); STE 17434 (29); STE 18073 (1). BOL 18993 (23d); 19843 (64). BOLUS & LEWIS: 1869/32 (58a); 20289 (58a & 59). BOND: 504 (59); 551 (14); 640 (5); 1144 (7b); 1194 (55). BOUCHER: 73 (15c); 113 (1). BOWIE: 397 (58a); 398, 399 (23a); 401 (22). BRITTEN: 770 (21). BUHR: NBG: 823/30, 1470/37 (64); 1471/37 (55). BULLOCK: 3717 (45a). BURCHELL: 169 (57a); 986 (15a); 1319 (47a); 1321 (50); 1343 (32a); 1356 (*Geissorhiza spiralis*); 3909 (37); 5612, 5630, 5644, 6057 (40); 8533 (15a). BURGER: STE: 30198 (41); 30202 (11); 30206 (64 & 65); 30207 (42); 30223, 30224 (32b).

CARMICHAEL: 370 (45a). CASSIDY: 224 (40). CASTELNAU: 26 (47b); 547, 609 (15a); 548 (57a). CHEADLE: 718 (44). CLOETE: NBG 1324/13 (58a). COMPTON: 1734A (32a); 2832 (31); 5270 (57a); 5305 (31); 5972 (57a); 6607 (18); 6872 (57c); 7276 (32a); 7695 (15a); 9155 (22); 9436 (59); 10857 (31); 10907 (15a); 11170 (7a); 11179 (?54c, ?57b); 11394 (18); 13241 (15a); 13452 (54d); 13462 (23a); 13474 (22); 13479 (23a); 13708 (54d); 13771 (22); 14585 (31); 15030 (14); 15926 (17); 16330 (22); 17087, 17361 (15a); 17434 (46); 18002 (15a); 18301 (22); 20182 (57b); 20846 (26); 20883 (55); 21077 (37); 21586 (34a); 21962 (?54a); 22768 (58b); 24182 (13); 24336 (23d); NBG: 1168/26 (59); 1858/36 (57b); 2008/36 (14); 2013/36 (57b). COMPTON & LAMB: NBG 1317/31 (13). CONRATH: 610 (58a); 611 (57a). CONRADIE: STE 30222 (23c). COOPER: 3184 (44). CRUDEN: 248 (44); 437 (37).

DALY & SOLE: 285, 315 (43). DÄNIKER: SA11 (57c). DAVIS: SAM: 60103 (15a) 60704 (23a); 61745 (58b); 61747 (1); 63694 (5). DENMAN: 43 (47c). DENOON: 39 (34a). DEVENISH: 336, 1087 (45b). DE VOS: 184 (57c); 1090 (15a); 1092 (58b); 1093 (57d); 1096 (57c); 1098 (23a); 1104 (57d); 1260 (13); 1267, 1270 (15a); 1271 (47b); 1276 (35c); 1279 (23a); 1282 (59×54d); 1283 (23a); 1284 (13); 1463 (59); 1464, 1466 (14); 1470 (54a); 1565 (23a); 1569 (61); 1573 (35d); 1575 (6); 1577 (35a); 1581 (52); 1582 (49); 1583 (67); 1604 (64); 1615 (46); 1620 (58a); 1668 (63); 1676 (35d); 1687 (59); 1690 (13); 1691 (54d); 1692 (23a); 1694 (18); 1697 (11); 1700 (32b); 1733 (44); 1734 (43); 1737 (60); 1738 (28); 1740 (15a); 1743 (43); 1746 (54a); 1753 (57b); 1755 (57a); 1766 (29); 1772, 1773 (17); 1800B (61); 1832 (54a); 1883 (35d); 1885, 1886 (35c); 1896 (14); 1897 (54b); 1906 (38); 1910 (21); 1917 (19); 1918 (22); 1920 (63); 1921 (4); 1923 (15b); 1924 (55); 1925 (11); 1926 (65); 1928 (54d); 1929 (52); 1930 (60); 1931 (35a); 1932 (49); 1934 (61); 1948 (32a); 1950 (31); 1952 (54b); 1953 (57b);

1956 (36); 1966 (57e); 1973 (15b); 1977 (57c); 1991 (65); 1999 (36); 2004 (57b); 2017 (9); 2018 (26); 2020 (12); 2024 (64); 2030 (56); 2037 (54c); 2041 (54b); 2053 (5); 2056 (36); 2063 (40); 2073 (35b); 2078 (38); 2101 (47b); 2102 (33); 2106 (30); 2108 (4); 2120 (23c); 2125 (32c); 2135 (54a); 2138 (25); 2143 (54a); 2157 (32); 2159 (33); 2168 (1); 2171 (69); 2173 (7b); 2183 (27); 2187 (45a); 2201 (37); 2211 (53); 2212 (39); 2215 (48); 2218 (32); 2226 (9); 2232 (8); 2258 (34a). DE WET: 307 (34a). DE WITTE: 2310 (45a). DIELS: 732 (68). DIX: 89 (37). DOD: 563 (15a); 564 (?54d, ?57); 565 (15c); 565A (23a); 1159 (15a) 1160 (15d); 1256 (15c); 1261, 1264, 1300 (65a); 1304 (15a & 57b); 1338 (23a); 1407 (57d); 1465 (23a); 1489 (57d); 1539 (57d); 1562 (13); 1580 (57b); 1589 (54a); 1619, 1620 (22); 1645 (23a); 1672 (54a); 1795 (13); 2102 (57a); 2570 (15a); 2659 (15d); 2696 (13); 2759 (15a); 2969 (57 partly); 3032 (58b); 3275 (54a); 3276 (13); 3613, 3614 (57a); 3631 (13). DOWSON: 646 (45b). DRÈGE: 197 (58a); 198 (43 partly); 199 (13); 202 (15a); 203 (15b); 205, 206 (22); 208 (23b); 263 (43); 503 (13 & 1); 538 (29 & 57); 2636 (7, 7b, 3, & 57); 2637, 2637a, 2637b (7b); 4038 (partly 3); 4041 (54a); 8449 (1, 40 & 15a); 8450 (6 & 23a); 8450a (23b & 57); 8451 (31, 35a & 22). DUTHIE: 509, 541 (15a); 621 (23a); 1243 (40); 1244 (57c); 1245 (29); 1246 (35b); 1463 (57c & 29); 1927 (13). DYER: 1619 (43); 2414, 2421 (44). DYER & COLLETT: 4720 (34c).

ECKLON: U.J. 700 (58a & 15d); 701 (57b); 702 (57a); 703 (23a); 704, 705 (15a); PRE 11153 (23a). ECKLON & ZEYHER: 196 (57a); 197 (58b); 200 (15c); 201 (15a & b); 203 (15a & b & 35a); 204 (14); 205, 206 (15d & 22 & 40); 207 (23a); 208 (23b); PRE 22293 (22). EDWARDS: BOL 14426 (15c); 14431 (22). ESTERHUYSEN: 2933 (57b); 5274 (55); 5453 (7b); 5460 (7a); 5821 (18); 6082 (23a); 6523, 6787 (38); 7120 (57c); 8042 (57b); 8043 (56); 8994 (47a); 9249 (35c); 10287 (15b); 10291 (35c); 10632 (38); 10700 (57c); 11839, 11868 (22); 12171 (5); 13002 (57b); 13924 (47b); 14568 (47a); 15690 (35c); 15759 (23a); 15826 (22); 15880 (57); 16406 (?38); 16162 (5); 17337 (15d); 17380, 17381 (32c); 17582 (25); 18688 (35c); 18711 (15a); 18719 (47a); 18867, 19003 (13); 19004 (54a); 19412 (57d); 20369a, 21754 (57b); 23128 (23a); 24350 (46); 28008 (38); STE 30192 (47a); 31132 (47b); 32181 (25). EVANS: 373 (45a).

FLANAGAN: 1745 (59). FOCK: NBG 1504/25 (15a & b). FOURCADE: 365, 897 (40); 912 (57c); 1448 (40); 2831 (38); 3134, 3430 (57c); 5612 (40). FOURIE: BLFU 3332 (34). FRIES, NORLINDH & WEIMARCK: 454 (35a); 460 (37); 462, 1053 (43); 1203 (37); 1290 (57c); 1291 (29); 1369 (21); 1559 (57c). FROWEIN: HTM 16293 (23c); 16304 (57b).

GALPIN: 1516 (34); An 1895 (37); 2685 (nearest 57b); 2794, 3023 (37); 4655 (40 & 57c); 4656 (57c); 4657 (35a); 4658 (15a); 4977 (57b); 5358 (29); 6848 (34c); 10839 (44). GAMBLE: 22143 (15a). GARABEDIAN: SAM 50377 (23a). GARSIDE: 92 (57a); 281 (15a); 282 (57b); 283 (57a); 1030 (29); 1065 (23a). GEESTERANUS: 6040 (45a & b). GILLETT: 353 (15b); 1038 (54a); 1137 (57c); 2088 (13); 2100 (?38); 2255 (57d); 3645 (23a); 3669 (23c); 3671 (1); 3713 (24); 4028 (54b); 4029 (14); 4105 (57b). GOLDBLATT: 260 (65); 276, 429 (68). GRANT: 2299 (58a); 2364 (15a). GROBLER: 425 (57b). GUTHRIE: 3013 (35c); BOL 18558 (5); 24781, 24783 (57c).

HAFSTRÖM & ACOCKS: 327 (57b partly); 329 (22); 2079 (57a). HALL: 155 (23a); 200 (62); 985 (32b); 2379 (32a); 3176 (48); 3199 (15a); 3246 (47a); 3249 (32a); 3257 (61); 3258 (47a); 3259 (47). HANEKOM: 1433 (32a); 1443 (41). HARDY: 64 (65). HELMS: 59, 1400 (57c). HENRICI: 7 (34a). HOLLAND: 3633 (35a). HUMBERT: 9543 (15a). HUTCHINSON: 154 (29); 159 (58b); 176 (23a); 232 (58a); 232A (23a); 363 (57b); 659 (22); 1220, 1435 (38).

JACOT-GUILLARMOD: 978 (34c); 2096A (45a); 5007 (29 & 43); 5239 (43); 5240 (29); 5241 (43); 5407, 5408 (44). JOHNSON: 156 (15d); 1022 (43); 1295 (34a). JORDAAN: 1263 (55). JORDEN: 8 (37). JOUBERT: STE 27156 (67); 27157 (52); 27158 (50); 27159 (67); 27166 (62); 30193 (47); 30239, 30240 (62). JOUBERT & DE VOS: 1585 (62).

KASPIEW: 11 (partly 29). KEET: 1052 (38). KERFOOT: 5374 (25); 5894 (57c); 5899 (22); 6011 (57a). KEYTEL: 1819 (57c). KIES: 148 (59). KILLICK & VAHRMEIJER: 3549, 3736 (45a).

LACEY: 13A (45a). LAMB: NBG 1162/30 (47c); 1633/30 (46); 1652/30 (47a). LEIBOLD: 228 (22). LEIGHTON: 93 (14); 244 (22); 245 (23c); 246 (23a & c); 247 (23a); 599 (17); 1084 (15a); 1151A (18); 1249 (57b); 1284 (32a); 1288 (46); 2005 (23a); BOL 24768, 24769 (57b).

LEIPOLDT: 312 (57c); 483 (63); 3050 (13); 3052 (14); 3053 (64); 3193 (57b); 3541 (14); 3542 (18); 3543 (58b); 3544 (35c); 3545 (23a); 3546 (57b); 3572 (61a); 3822 (64); 3823 (61); 3824 (24); 3825 (11); 3826 (18); 3827 (1 & 3); 3828 (1); 3829 (13); 3830 (57b); 3831 (7a); 3832 (8); 4077, 4165 (23a); 4247 (3); 4420 (13); 4421, 4422 (57b); 4423 (63); 4440, 4441, 4444 (57b); 4442 (46); 4445 (?54, ?57); 4446 (1); BOL 20487 (14); 20770 (6); 20771 (60); 20815 (13); 20951 (54b); 21261 (61); 21264 (23a); 21267 (59); 21268 (4); 21509, SAM 52400 (15a); 54094 (14); 54097 (54b). LEISTNER: 277 (49); 279 (52). LEWIS: 59 (57e); 68 (22); 149 (28); 758 (22); 1056 (23); 1057 (54c); 1058 (59); 1059 (58a); 1060 (17); 1062 (54d); NBG 1105/37 (47c); 1348 (57b); 1400 (46); 1401 (15b); 1468 (22); 1599 (57e); 1630 (18); 1631 (32a); 1663 (57d); 1664 (25); 1851 (54b); 1852 (14); 2005 (12); 2010 (4); 2011 (64); 2012 (41); 2013 (11); NBG 2024/22 (23b); 2572 (5); 2632 (61); 2666 (46); 2667 (57b); 2668 (14); NBG 2703/32 (47a); 3566 (54a); 3567 (13); 4437 (44); 5216 (18); 5238 (54b) 5535 (54d); 5826 (35b); 5831 (64); 5835 (60); 5844 (55); 5845 (15a); 5864 (64); 5981 (23b); BOL 24775 (47c); SAM 52950, 52983 (13); 54303 (57a); 57970 (15a); 58093 (57b); 58822 (18); 58956 (25); 60230 (4); 60231 (64); 60234 (29). LEWIS & DAVIS: SAM 60106 (32b); 60060 (11); 61061 (55); 61071 (1). LEWIS & SALTER: 3557 (59a). LIEBENBERG: 6503 (29). LONG: 185 (44); 186, 187 (37); 472 (35a); 617 (47c); 829 (37); 975 (44); 1450 (35a). LORENZO: 17 (19); STE 30190 (15a). LÖTTER: STE 16853 (22). LOUBSER: 451 (14); 877 (40); 944 (27); 949 (11); 974 (23a); 975 (59a); 2071 (32c); 2073 (47b); 2124 (59a); 2132 (35c). LOW: STE 1318a (57a).

MACOWAN: 246 (44 & 57b); 250 (44); 254 (23a); 255, 256 (15a); 525 (59 & ?54d); 529 (23a); 1547 (34a); 1780 (13 & 57c); 2171 (14); 2498 (13); 2565, 2616 (23a); 2573 (15a); SAM 20725 (14). MAGUIRE: 210 (11); 1768 (5). MALAN: STE 30203 (54a); 30205 (64); 30312 (51); 30313 (1). MARAIS: 72 (15a); 77A (40); 77C (15b); 1367 (34c). MARKÖTTER: STE 18966 (27). MARLOTH: 65, 112 (15a); 208 (22); 210 (58b); 2658 (13); 3017a (47b); 5539 (23a); 5566 (64); 5572 (57c); 5573 (35 & 46); 5626 (23a & 57); 5628 (29); 6137 (46); 6213 (14); 6742 (7b); 7252 (57a); 7492 (66 & 40); 8027 (17); 9083 (15a); 9084 (34c) 9644 (67); 35c
9658 (62); 10251 (32b), 10290 (47b); 10355 (23a); 10594, 12202 (15a); 12794 (46); 12795 (61); 13272 (7b). MARSH: 510 (12); 394 (6). MARTIN: 103 (?38); 1211 (15a); NBG 1228/37 (probably 23c); 1296/37 (22); 2056/36 (32a); STE 30195 (43); 30196, 30197 (21); 30219, 30220 (44). MASTER: NBG 1858/36 (57b). MATHEWS: 12 (57b?); NBG 1418/30 (23a); 1656/15 (15a); BOL 22169, SAM 53177 (28). MEEBOLD: 91 (58b); 11197 (57c); 14831 (57a); 14832 (57b); 14833 (59). MIDDLEMOST: 1749 (14); 2160 (65). MIERS: 401 (22). MOSS: 4097 (15a); 4293 (57e); 4297 (57c); 4298 (23a); 13313 (57c); 16793 (34c). MUIR: 505 (29); 715 (57c & 47c); 898 (?57b); 949 (47c); 958 (46 & 15a); 996 (35a); 1022 (15a); 1595 (40); 2734 (35a); 2850 (57a); 3334, 4847 (35a); 4848 (57b); 4872 (47a); 4873 (29); 4875 (15a); 16759 (35a). MUND & MAIRE: 580 (11).

NEETHLING: BOL 24789 (61b). NOEL: 989, 7864 (34a). NORDENSTAM: 331 (44); 762 (32b). NORLINDH & WEIMARCK: 5055 (45a). NORTIER: STE 30194 (6). NUNNS: HTM 23794 (47c).

OLDENBURG: 279 (15d); 280, 281 (15a); 426 (?57, ?59); 453 (15c). OLIVER: 3169 (20); 3475 (35d); STE 30273 (3); 30282 (7b); 30283 (6). OLIVIER: STE 30191 (47a); 30199 (60). OSTENFELD: 174 (57c). OTTLEY: 11506 (15b).

PAMPHLETT: 65 (23a). PAPPE: SAM 20692 (57a); 20696, 20699 (23a); 20707 (44); 20734 (29); 25177 (22). PARKER: 3709 (57b & 58b); 4215 (15a); 4332 (57b); 4586 (15a). PATERSON: 696 (37); 1129 (47); 2138 (35a). PEARSON: 151 (15a); 6550 (19); 6656 (7a); 6671 (8); 7082 (57b); NBG 2504/14, 2544/14 (31). PENBERTHY: NBG 2832/35 (23d). PENTHER: 608 (13); 678 (23a); 687 (24). PHILLIPS: 1303 (57c); 1524 (57c & 29); 7506 (26). PILLANS: 6710 (13); 6943 (58a); 7397 (57a); 7708 (23a); 7715 (5); 7804 (14); 10164 (57c). POCOCK: S112 (31); 144 (5). POLHILL & PAULO: 1882 (45a). PURCELL: SAM 46254 (15b); 46255 (15a); 46256 (15a & 47a).

RATTRAY: 208 (37). REHMANN: 62 (40); 602 (29); 935 (57a); 1430, 1437 (15b); 1735 (23a); 1836, 1838, 1871 (15a); 7624 (23a). RENDLE: 110 (57b). RICHARDS: 14010 (45b). ROBERTS & ADENDORF: HTM 17631 (57d). RODIN: 1322 (40); 1452 (18). ROGERS: 1/80 (29 & 15a); 2957 (15b); 3035 (40); 4386, 4686 (29); 15560 (15c); 16322 (58b); 16759 (35a); 16964 (54c); 17666, 17924 (57a); 26573 (57d); 26714 (40); 27204 (57b); 27374 (44); 27690 (34a); 28747 (15a). ROGERS & MOSS: 4297 (57c partly). ROSS-FRAMES: BOL 18993 (23d); 19221 (32b); 21275 (15a); 24772 (57a); 24773 (6); 24779 (57a). ROSSOUW: STE 8902 (34a). RYCROFT: 1983 (59). RUST: 566 (40); 622 (21).

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